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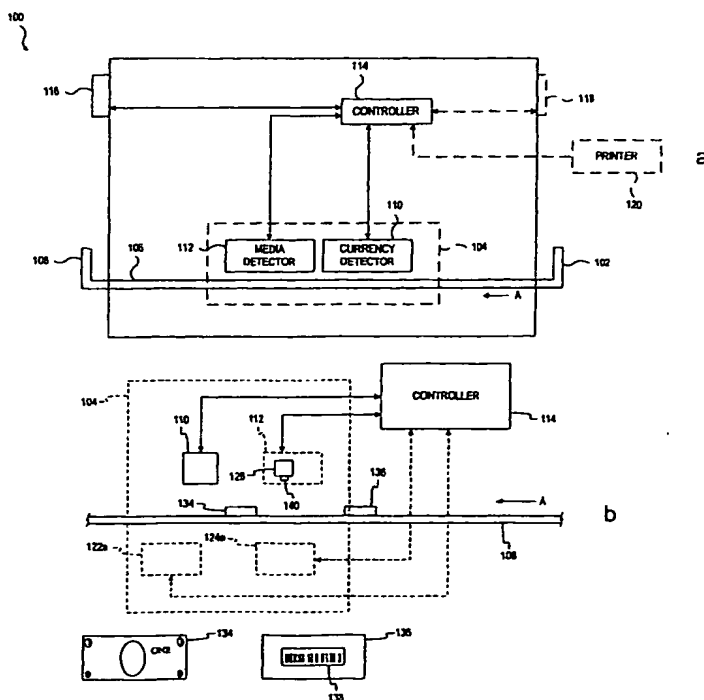
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- (71) Applicant: CUMMINS-ALLISON CORP. [US/US];
891 Feehanville Drive, Mount Prospect, IL 60056 (US).
- (72) Inventors: JONES, William, J.; 280 Poteet Avenue, Barr-
ington, IL 60010 (US). CSULITS, Frank, M.; 18192 W.
Banbury Drive, Gurnee, IL 60031 (US). KLEIN, Robert,
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(54) Title: SYSTEM AND METHOD FOR PROCESSING CURRENCY BILLS AND SUBSTITUTE CURRENCY MEDIA IN A SINGLE DEVICE



(57) Abstract: A document processing device having an evaluation region disposed along a transport path between an input and output receptacle capable of processing both currency bills and barcoded media. The evaluation region includes detectors for detecting predetermined characteristics of currency bills and a barcode reader for scanning the barcoded media. A controller coupled to the evaluation region controls the operation of the document processing device and receives input from and provides information to a user via a control unit. In some embodiments, the document processing device may have any number of output receptacles, and the control unit allows the user to specify which output receptacle receives which type of document. In some embodiments, an optional coin sorter may be coupled to the document processing device to allow document and coin processing. The document processing device may be coupled to a network to communicate information to devices linked to the network.

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**SYSTEM AND METHOD FOR PROCESSING CURRENCY BILLS
AND SUBSTITUTE CURRENCY MEDIA IN A SINGLE DEVICE**

FIELD OF THE INVENTION

The present invention relates generally to the field of document processing systems and, more particularly, to a system and method for processing both currency bills and other documents in a single document processing device.

BACKGROUND OF THE INVENTION

Manufacturers of slot machines used in casinos and other gaming establishments are developing coinless redemption slot machines. Lucky winners using these machines will receive their payout in the form of a cashout ticket instead of coins or currency bills. The cashout ticket is encoded, typically in the form of a barcode, with a number that is associated with the payout amount.

To redeem the payout, the winner may insert the cashout ticket into a bill validator or bill acceptor which validates the ticket and dispenses the payout amount in cash. The bill validator also accepts currency, so when the casino operators empty the validators, the bill cartridges may contain a combination of currency bills and cashout tickets.

Most casinos are equipped with currency processing devices which rapidly sort, count, and authenticate currency bills. However, these machines cannot handle or recognize cashout tickets, so the operator must manually hand-sort the currency bills from the cashout tickets so that they can be processed separately. The hand-sorting and manual-entry steps are both time and labor intensive.

Other markets besides the gaming market would benefit from a device that could process both currency and currency substitutes. For example, some retailers are placing self-checkout stations at the point-of-sale. A customer gathers the products to be purchased and self-scans the products at the self-checkout station without the assistance of a cashier. The customer may pay by credit or debit card or by cash, for example. If paying by cash, the customer typically inserts the currency bills into a bill acceptor or bill validator at the self-checkout station. However, the customer may also desire to redeem store coupons, for example, at the point-of-sale. To do so, the customer would deposit store coupons into a receptacle at the self-checkout station. The cartridges in the self-checkout station would thus contain both currency bills and store coupons.

When the store operators empty the cartridges, they must hand-sort the store coupons from the currency bills and process the store coupons separately. Again, this hand sorting and separate processing is tedious and requires multiple counting machines. A single machine that could process both currency bills and store coupons would save time, lower costs, and
5 increase the overall desirability of using self-checkout stations.

SUMMARY OF THE INVENTION

According to one embodiment of the present invention, there is provided a document processing device for processing a stack of currency bills and substitute currency media. Substitute currency media include documents which are redeemable for
10 any combination of cash, goods, or services. One aspect of the present invention is generally directed to an apparatus having at least two sensors, a currency sensor adapted to scan for at least one characteristic of a currency bill and a media sensor adapted to scan for at least one characteristic of a substitute currency medium. Another aspect of the present invention is generally directed to an apparatus having a single sensor which is
15 adapted to scan for at least one characteristic of a currency bill and for at least one characteristic of a substitute currency medium.

In a specific aspect of the present invention, the substitute currency media include barcodes, the media sensor is a barcode reader, and the characteristic is whether a valid barcode is detectable on the substitute currency media. In this specific aspect of the
20 present invention, a transport mechanism transports the currency bills and substitute currency media, one at a time, from an input receptacle to at least one output receptacle. A controller controls the operation of the transport mechanism and the operation of the sensors. In one embodiment, the apparatus includes one output receptacle only. In other aspects of the present invention, the device includes more than one output receptacle and
25 a control unit. The operator may specify which of the output receptacles are to receive which type of documents, or different types of documents may be routed to specific output receptacles according to pre-programmed instructions. For example, currency bills may be directed to a first output receptacle and substitute currency media may be directed to a second output receptacle. A memory coupled to the controller may store
30 information about the documents processed, such as the denomination and amounts of currency bills processed, the number of substitute currency media processed, the number

of suspect currency bills processed, the value of substitute currency media processed, and so forth.

According to one embodiment of the present invention, there is also provided a method of processing both currency bills and substitute currency media in a single document processing device. A stack of documents including currency bills and substitute
5 currency media are received in an input receptacle. These documents are transported, one at a time, past a currency detector and past a media detector, in any order. The currency detector scans each document for at least one characteristic associated with a currency bill, and the media detector scans each document for at least one characteristic associated
10 with a substitute currency medium. The documents are directed to one or more output receptacles, according to pre-programmed or operator-specified instructions. The device may also generate and display information to the operator via a control unit. The information may include the number of documents processed, the denominations and amounts of currency bills processed, the number of substitute currency media processed,
15 the number of suspect currency bills processed, and so forth.

The above summary of the present invention is not intended to represent each embodiment, or every aspect, of the present invention. Additional features and benefits of the present invention will become apparent from the detailed description, figures, and claims set forth below.

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

Other objects and advantages of the invention will become apparent upon reading the following detailed description in conjunction with the drawings in which:

FIG. 1a is a functional block diagram of a document processing device according to one embodiment of the invention;

25 FIG. 1b is a functional block diagram of an evaluation region of a document processing device according to one embodiment of the present invention;

FIG. 2 is a perspective view of a document processing device according to one embodiment of the present invention;

30 FIG. 3 is a front view of a document processing device according to one embodiment of the present invention;

FIG. 4 is a perspective view of an evaluation region according to one embodiment of the document processing device of the present invention;

FIG. 4b is a side view of an evaluation region according to one embodiment of the document processing device of the present invention;

5 FIG. 5 is a perspective view of a compact document processing device having single output receptacle according to one embodiment of the present invention;

FIG. 6 is a side cross-sectional view of the device shown in FIG. 5;

FIG. 7a is a perspective view of a compact document processing device having dual output receptacles according to one embodiment of the present invention;

10 FIG. 7b is a side cross-sectional view of the device shown in FIG. 7a;

FIG. 8 is a functional block diagram of a document processing device coupled to coin sorting device according to one embodiment of the present invention;

FIG. 9 is a perspective view of a compact coin sorting device according to one embodiment of the present invention;

15 FIG. 10a is a perspective view of a funds processing machine according to one embodiment of the present invention;

FIG. 10b is a side view of the funds processing machine of FIG. 10a which schematically illustrates the various modules present in the funds processing machine;

FIG. 11 is a functional block diagram of a network of document processing machines in communication with a computer network;

20 FIG. 12 is a flowchart describing the operation of a document processing device according to one embodiment of the present invention;

FIG. 13 is a flowchart further describing the operation of a document processing device according to any embodiment described in connection with FIG. 12; and

25 FIG. 14 illustrates a functional block diagram of a touch/video display according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

FIG. 1a is a functional block diagram of a document processing device 10 according to one embodiment of the present invention. The document processing device 100 generally includes an input receptacle 102, an evaluation region 104, a transport mechanism 106, and an output receptacle 108. As explained below, in alternat

embodiments, the device 100 includes more than one output receptacle 108. The output receptacle 108 may also be variously referred to as a reject or offsort pocket or receptacle. Disposed along the transport path 106 is a currency detector 110 and a media detector 112 as functionally illustrated in FIG. 1a. The currency detector 110 and a control unit 116 are connected to a controller 114, which is adapted to control the operation of the device 100 and to communicate information to and from the control unit 116. For example, the controller 114 may send display information to and receive operator input from the control unit 116. Optionally, the control unit 116 may comprise a touch screen which is coupled to the device 100, or it may comprise a combination of a desktop computer or laptop, display, and/or keyboard which are coupled to the device 100. An optional printer 120 is shown coupled to the device 100. In an alternate embodiment, the device 100 is not coupled to a printer 120.

In the illustrated embodiment, the device 100 includes a communications port 118 which is coupled to the controller 114. The controller 114 may comprise one or more processors which are adapted to control specific components in the device 100 and to process information associated with specific components in the device 100, the control unit 116, or the communications port 118. The communications port 118 may optionally be a serial port, a parallel port, a USB port, a wireless port adapted for wireless communication with a remote device, or any other suitable I/O port. In an alternate embodiment, the device 100 does not include the communications port 118. The controller 114 may further comprise memory, such as random access memory or any other suitable memory.

Although the currency detector 110 is shown to be disposed on one side of the transport path 106, it is understood that the currency detector 110 may instead be disposed on the opposite side of the transport path 106 only or on both sides of the transport path 106. In the same manner, the media detector 112 may be disposed on the opposite side of the transport path 106 only or on both sides of the transport path 106. These alternate embodiments are described in more detail in connection with FIG. 1b below.

In the illustrated embodiment of FIG. 1a, a stack of currency bills and substitute currency media is provided to the input receptacle 102 in any order or in a predetermined

order. In one embodiment, the operator provides a mixed combination of currency bills and substitute currency media to the input receptacle 102, which are processed and delivered to one or more output receptacles. In another embodiment, the operator provides a stack of currency bills only to the input receptacle 102, which are processed
5 and delivered to one or more output receptacles, and then a stack of substitute media only to the input receptacle 102, which are processed and delivered to one or more output receptacles, or vice versa. In this embodiment, the operator may further indicate via the control unit 116 which type of document is to be processed, and the controller 114 may “deactivate” one or more detectors in the evaluation region 104. For example, if the
10 operator indicates that the type of documents to be processed is currency bills, the controller 114 may instruct the media detector 112 to ignore the document as it passes along the transport path 106. Alternatively, if the operator indicates that the type of documents to be processed is substitute currency media, the controller 114 may instruct the currency detector 110 to ignore the document as it passes along the transport path
15 106. Alternatively, the currency detector 110 and the substitute currency media 112 both detect characteristics of the document passing along the transport path, and the control unit 116 may alert the operator of an error condition, such as a substitute currency medium was detected in a stack of currency bills, or a currency bill was detected in a stack of substitute currency media. The operator may set aside the detected document for
20 later processing.

As used herein, a U.S. currency bill refers to U.S. legal tender, such as a \$1, \$2, \$5, \$10, \$20, \$50, or \$100 note, and a foreign currency bill refers to any bank note issued by a non-U.S. governmental agency as legal tender, such as a Euro, Japanese Yen, or British Pound note. A “currency bill” can be either a U.S. or foreign currency bill. The
25 terms “currency note” and “bank note,” are synonymous with the term “currency bill.”

The term “substitute currency media” refers to redeemable documents. A redeemable document is a document that can be (a) redeemed for cash or (b) exchanged for goods or services or (c) both. Examples of substitute currency media include without limitation: casino cashout tickets (also variously called cashout vouchers or coupons)
30 such as “EZ Pay” tickets issued by International Gaming Technology or “Quicket” tickets issued by Casino Data Systems; casino script; promotional media such as Disney Dollars

or Toys 'R Us "Geoffrey Dollars"; or retailer coupons, gift certificates, gift cards, or food stamps. Substitute currency media may include a barcode, and these types of substitute currency media are referred to herein as "barcoded tickets." Examples of barcoded tickets 136 include casino cashout tickets such as "EZ Pay" Tickets and "Quicket"

5 cashout tickets, barcoded retailer coupons, barcoded gift certificates, or any other promotional media that includes a barcode. The singular form of "substitute currency media" is referred to as "substitute currency medium" or "medium" for short.

As used herein, a "document" includes a currency bill or a substitute currency medium. Likewise, the term "documents" includes currency bills and/or substitute

10 currency media.

The term "substitute funds" includes casino script, paper tokens, and barcoded tickets. The term substitute currency media encompasses substitute funds, such that the term substitute funds defines a subset of documents encompassed by the term substitute currency media.

15 As is known, the dimensions of a U.S. currency bill are about 2.5 inches x 6 inches (6.5 cm x 15.5 cm). All U.S. currency bills have the same dimensions, but in many foreign countries, the dimensions from one denomination to another varies. In addition, certain types of substitute currency media such as "EZ Pay" tickets have approximately the same dimensions of U.S. currency, however, it is understood that the dimensions of

20 substitute currency media may vary from type to type. The device 100 of the present invention according to any embodiment described herein is adapted to process documents having the same dimension or documents having varied dimensions.

Still referring to FIG. 1a, the transport mechanism 106 is adapted to transport the documents, one at a time, through the device 100 in the direction of arrow A, past the

25 currency detector 110 and the media detector 112, and to the output receptacle 108. The currency detector 110 is adapted to detect one or more predetermined characteristics on a currency bill or on a particular kind of substitute currency medium, such as a Disney Dollar, and the media detector 112 is adapted to detect one or more predetermined characteristics on a particular kind of substitute currency medium, such as a barcode on a

30 barcoded ticket, as explained in more detail in connection with FIG. 1b. The currency detector 110 comprises one or more sensors depending on a number of variables. The

variables relate to whether the device 100 is authenticating, counting, or discriminating denominations of currency bills, and what distinguishing characteristics of the currency bills are being examined, for example, size, thickness, color, magnetism, reflectivity, absorbability, transmissivity, electrical conductivity, serial number, and so forth. The
5 currency detector 110 may also employ a variety of detection means including, but not limited to, any combination of the following: a size detector, a density sensor, an upper optical scan head, a lower optical scan head, a single or plurality of magnetic sensors, a thread sensor, an infrared sensor, an ultraviolet/fluorescent light scan head, or an image scanner. These detection means and a host of others are disclosed in commonly assigned
10 U.S. Patent No. 6,278,795, entitled "Multi-Pocket Currency Discriminator," which is herein incorporated by reference in its entirety. Examples of discriminating denomination information from a currency bill are shown and disclosed in commonly assigned U.S. Patent No. 5,815,592, which is herein incorporated by reference in its entirety.

In the specific case of substitute currency media, the variables may also relate to
15 what distinguishing characteristics of the substitute currency media are being examined, such as any combination of the following without limitation: a barcode, a magnetic ink character recognition (MICR) pattern, characters readable by optical character recognition (OCR), including information printed according to the OCR-A and OCR-B fonts, a magnetic pattern, an optical variable device (OVD) pattern such as a hologram, a
20 magnetic or electrically conductive thread, conductive ink, magnetic ink, an electrically conductive polymer, perforations, a coded watermark, or other encoded information. The detection of these distinguishing characteristics may be carried out by the media detector 112, which, in alternate embodiments, may employ a variety of detection means including, but not limited to, any combination of the following: a barcode reader, an optical scan
25 head, a magnetic sensor, a thread sensor, an infrared sensor, an ultraviolet/fluorescent light scan head, or an image scanner. These detection means and a host of others are disclosed in commonly assigned U.S. Patent No. 6,278,795, entitled "Multi-Pocket Currency Discriminator," previously incorporated by reference, and may be modified in accordance with the present invention to detect distinguishing characteristics associated
30 with substitute currency media.

FIG. 1b shows a functional block diagram of a portion of an evaluation region 104 according to one embodiment of the present invention. The evaluation region 104 generally includes a currency detector 110, a media detector 112, and a controller 114. The evaluation region 104 may optionally include a second currency detector 122a and/or
5 a second media detector 124a which may be disposed on the opposite side of a transport mechanism 106 as shown in FIG. 1b. The currency detector 110 may include any combination of the detection means identified above. In the illustrated embodiment, the media detector 112 comprises a barcode reader 128 and a mirror 130. Barcode readers are well known in the art, and will not be described in detail herein. Generally, barcode
10 readers typically use a light beam generated by a laser diode or LED light source to illuminate a barcode label. The laser beam or LED beam is deflected in a certain pattern across the barcode label. The reflected light representing the light and dark bars on a barcode label are processed and then converted into a digital signal representing the barcode pattern. The digital signal is analyzed by a controller where the signal is decoded
15 into characters (e.g., alphanumeric and/or punctuation).

In one embodiment, the barcode reader 128 is an MS-911 barcode reader manufactured by Microscan. In alternate embodiments, other barcode readers may be employed, such as, for example, the LM 520, LazerData 8000, LazerData 9000E, or LD12000 barcode readers manufactured by PSC, Inc., the MS-880, MS-7100 or MS-
20 7180 barcode readers manufactured by Microscan, the Maxiscan 2100 or Maxiscan 3300 barcode readers manufactured by Intermec, or an LED barcode reader manufactured by Welch Allyn. It is understood that the present invention is not limited to any particular barcode reader. The selection of a particular barcode reader depends on a number of factors, including size constraints in the evaluation region 104 of the document processing
25 device, the particular barcode symbology to be scanned, and the desired scan rate. For example, the LazerData 9000E, manufactured by PSC, Inc., has scan rates ranging from 500 scans per second to 2000 scans per second, and is adapted to scan a linear barcode. The dimensions of the LazerData 9000E are approximately 3.84" (D) x 2.52" (L) x 2.52" (W), or 97.5 mm (D) x 64 mm (L) x 64 mm (W). The MS-911 barcode reader has
30 dimensions of approximately 3" (H) x 2.13" (W) x 1.63" (D), or 75 mm (H) x 53.5 mm (W) x 41 mm (D), and has a scan rate of up to 2000 scans per minute.



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**SYSTEM AND METHOD FOR PROCESSING CURRENCY BILLS
AND SUBSTITUTE CURRENCY MEDIA IN A SINGLE DEVICE**

FIELD OF THE INVENTION

The present invention relates generally to the field of document processing systems and, more particularly, to a system and method for processing both currency bills and other documents in a single document processing device.

BACKGROUND OF THE INVENTION

Manufacturers of slot machines used in casinos and other gaming establishments are developing coinless redemption slot machines. Lucky winners using these machines will receive their payout in the form of a cashout ticket instead of coins or currency bills. The cashout ticket is encoded, typically in the form of a barcode, with a number that is associated with the payout amount.

To redeem the payout, the winner may insert the cashout ticket into a bill validator or bill acceptor which validates the ticket and dispenses the payout amount in cash. The bill validator also accepts currency, so when the casino operators empty the validators, the bill cartridges may contain a combination of currency bills and cashout tickets.

Most casinos are equipped with currency processing devices which rapidly sort, count, and authenticate currency bills. However, these machines cannot handle or recognize cashout tickets, so the operator must manually hand-sort the currency bills from the cashout tickets so that they can be processed separately. The hand-sorting and manual-entry steps are both time and labor intensive.

Other markets besides the gaming market would benefit from a device that could process both currency and currency substitutes. For example, some retailers are placing self-checkout stations at the point-of-sale. A customer gathers the products to be purchased and self-scans the products at the self-checkout station without the assistance of a cashier. The customer may pay by credit or debit card or by cash, for example. If paying by cash, the customer typically inserts the currency bills into a bill acceptor or bill validator at the self-checkout station. However, the customer may also desire to redeem store coupons, for example, at the point-of-sale. To do so, the customer would deposit store coupons into a receptacle at the self-checkout station. The cartridges in the self-checkout station would thus contain both currency bills and store coupons.

When the store operators empty the cartridges, they must hand-sort the store coupons from the currency bills and process the store coupons separately. Again, this hand sorting and separate processing is tedious and requires multiple counting machines. A single machine that could process both currency bills and store coupons would save time, lower costs, and
5 increase the overall desirability of using self-checkout stations.

SUMMARY OF THE INVENTION

According to one embodiment of the present invention, there is provided a document processing device for processing a stack of currency bills and substitute currency media. Substitute currency media include documents which are redeemable for
10 any combination of cash, goods, or services. One aspect of the present invention is generally directed to an apparatus having at least two sensors, a currency sensor adapted to scan for at least one characteristic of a currency bill and a media sensor adapted to scan for at least one characteristic of a substitute currency medium. Another aspect of the present invention is generally directed to an apparatus having a single sensor which is
15 adapted to scan for at least one characteristic of a currency bill and for at least one characteristic of a substitute currency medium.

In a specific aspect of the present invention, the substitute currency media include barcodes, the media sensor is a barcode reader, and the characteristic is whether a valid barcode is detectable on the substitute currency media. In this specific aspect of the
20 present invention, a transport mechanism transports the currency bills and substitute currency media, one at a time, from an input receptacle to at least one output receptacle. A controller controls the operation of the transport mechanism and the operation of the sensors. In one embodiment, the apparatus includes one output receptacle only. In other aspects of the present invention, the device includes more than one output receptacle and
25 a control unit. The operator may specify which of the output receptacles are to receive which type of documents, or different types of documents may be routed to specific output receptacles according to pre-programmed instructions. For example, currency bills may be directed to a first output receptacle and substitute currency media may be directed to a second output receptacle. A memory coupled to the controller may store
30 information about the documents processed, such as the denomination and amounts of currency bills processed, the number of substitute currency media processed, the number

of suspect currency bills processed, the value of substitute currency media processed, and so forth.

According to one embodiment of the present invention, there is also provided a method of processing both currency bills and substitute currency media in a single document processing device. A stack of documents including currency bills and substitute
5 currency media are received in an input receptacle. These documents are transported, one at a time, past a currency detector and past a media detector, in any order. The currency detector scans each document for at least one characteristic associated with a currency bill, and the media detector scans each document for at least one characteristic associated
10 with a substitute currency medium. The documents are directed to one or more output receptacles, according to pre-programmed or operator-specified instructions. The device may also generate and display information to the operator via a control unit. The information may include the number of documents processed, the denominations and amounts of currency bills processed, the number of substitute currency media processed,
15 the number of suspect currency bills processed, and so forth.

The above summary of the present invention is not intended to represent each embodiment, or every aspect, of the present invention. Additional features and benefits of the present invention will become apparent from the detailed description, figures, and claims set forth below.

20 **BRIEF DESCRIPTION OF THE DRAWINGS**

Other objects and advantages of the invention will become apparent upon reading the following detailed description in conjunction with the drawings in which:

FIG. 1a is a functional block diagram of a document processing device according to one embodiment of the invention;

25 FIG. 1b is a functional block diagram of an evaluation region of a document processing device according to one embodiment of the present invention;

FIG. 2 is a perspective view of a document processing device according to one embodiment of the present invention;

30 FIG. 3 is a front view of a document processing device according to one embodiment of the present invention;

FIG. 4 is a perspective view of an evaluation region according to one embodiment of the document processing device of the present invention;

FIG. 4b is a side view of an evaluation region according to one embodiment of the document processing device of the present invention;

5 FIG. 5 is a perspective view of a compact document processing device having single output receptacle according to one embodiment of the present invention;

FIG. 6 is a side cross-sectional view of the device shown in FIG. 5;

FIG. 7a is a perspective view of a compact document processing device having dual output receptacles according to one embodiment of the present invention;

10 FIG. 7b is a side cross-sectional view of the device shown in FIG. 7a;

FIG. 8 is a functional block diagram of a document processing device coupled to coin sorting device according to one embodiment of the present invention;

FIG. 9 is a perspective view of a compact coin sorting device according to one embodiment of the present invention;

15 FIG. 10a is a perspective view of a funds processing machine according to one embodiment of the present invention;

FIG. 10b is a side view of the funds processing machine of FIG. 10a which schematically illustrates the various modules present in the funds processing machine;

FIG. 11 is a functional block diagram of a network of document processing machines in communication with a computer network;

20 FIG. 12 is a flowchart describing the operation of a document processing device according to one embodiment of the present invention;

FIG. 13 is a flowchart further describing the operation of a document processing device according to any embodiment described in connection with FIG. 12; and

25 FIG. 14 illustrates a functional block diagram of a touch/video display according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

FIG. 1a is a functional block diagram of a document processing device 10 according to one embodiment of the present invention. The document processing device 100 generally includes an input receptacle 102, an evaluation region 104, a transport mechanism 106, and an output receptacle 108. As explained below, in alternative

30

embodiments, the device 100 includes more than one output receptacle 108. The output receptacle 108 may also be variously referred to as a reject or offsort pocket or receptacle. Disposed along the transport path 106 is a currency detector 110 and a media detector 112 as functionally illustrated in FIG. 1a. The currency detector 110 and a control unit 116 are connected to a controller 114, which is adapted to control the operation of the device 100 and to communicate information to and from the control unit 116. For example, the controller 114 may send display information to and receive operator input from the control unit 116. Optionally, the control unit 116 may comprise a touch screen which is coupled to the device 100, or it may comprise a combination of a desktop computer or laptop, display, and/or keyboard which are coupled to the device 100. An optional printer 120 is shown coupled to the device 100. In an alternate embodiment, the device 100 is not coupled to a printer 120.

In the illustrated embodiment, the device 100 includes a communications port 118 which is coupled to the controller 114. The controller 114 may comprise one or more processors which are adapted to control specific components in the device 100 and to process information associated with specific components in the device 100, the control unit 116, or the communications port 118. The communications port 118 may optionally be a serial port, a parallel port, a USB port, a wireless port adapted for wireless communication with a remote device, or any other suitable I/O port. In an alternate embodiment, the device 100 does not include the communications port 118. The controller 114 may further comprise memory, such as random access memory or any other suitable memory.

Although the currency detector 110 is shown to be disposed on one side of the transport path 106, it is understood that the currency detector 110 may instead be disposed on the opposite side of the transport path 106 only or on both sides of the transport path 106. In the same manner, the media detector 112 may be disposed on the opposite side of the transport path 106 only or on both sides of the transport path 106. These alternate embodiments are described in more detail in connection with FIG. 1b below.

In the illustrated embodiment of FIG. 1a, a stack of currency bills and substitute currency media is provided to the input receptacle 102 in any order or in a predetermined

order. In one embodiment, the operator provides a mixed combination of currency bills and substitute currency media to the input receptacle 102, which are processed and delivered to one or more output receptacles. In another embodiment, the operator provides a stack of currency bills only to the input receptacle 102, which are processed
5 and delivered to one or more output receptacles, and then a stack of substitute media only to the input receptacle 102, which are processed and delivered to one or more output receptacles, or vice versa. In this embodiment, the operator may further indicate via the control unit 116 which type of document is to be processed, and the controller 114 may "deactivate" one or more detectors in the evaluation region 104. For example, if the
10 operator indicates that the type of documents to be processed is currency bills, the controller 114 may instruct the media detector 112 to ignore the document as it passes along the transport path 106. Alternatively, if the operator indicates that the type of documents to be processed is substitute currency media, the controller 114 may instruct the currency detector 110 to ignore the document as it passes along the transport path
15 106. Alternatively, the currency detector 110 and the substitute currency media 112 both detect characteristics of the document passing along the transport path, and the control unit 116 may alert the operator of an error condition, such as a substitute currency medium was detected in a stack of currency bills, or a currency bill was detected in a stack of substitute currency media. The operator may set aside the detected document for
20 later processing.

As used herein, a U.S. currency bill refers to U.S. legal tender, such as a \$1, \$2, \$5, \$10, \$20, \$50, or \$100 note, and a foreign currency bill refers to any bank note issued by a non-U.S. governmental agency as legal tender, such as a Euro, Japanese Yen, or British Pound note. A "currency bill" can be either a U.S. or foreign currency bill. The
25 terms "currency note" and "bank note," are synonymous with the term "currency bill."

The term "substitute currency media" refers to redeemable documents. A redeemable document is a document that can be (a) redeemed for cash or (b) exchanged for goods or services or (c) both. Examples of substitute currency media include without limitation: casino cashout tickets (also variously called cashout vouchers or coupons)
30 such as "EZ Pay" tickets issued by International Gaming Technology or "Quicket" tickets issued by Casino Data Systems; casino script; promotional media such as Disney Dollars

or Toys 'R Us "Geoffrey Dollars"; or retailer coupons, gift certificates, gift cards, or food stamps. Substitute currency media may include a barcode, and these types of substitute currency media are referred to herein as "barcoded tickets." Examples of barcoded tickets 136 include casino cashout tickets such as "EZ Pay" Tickets and "Quicket"

5 cashout tickets, barcoded retailer coupons, barcoded gift certificates, or any other promotional media that includes a barcode. The singular form of "substitute currency media" is referred to as "substitute currency medium" or "medium" for short.

As used herein, a "document" includes a currency bill or a substitute currency medium. Likewise, the term "documents" includes currency bills and/or substitute

10 currency media.

The term "substitute funds" includes casino script, paper tokens, and barcoded tickets. The term substitute currency media encompasses substitute funds, such that the term substitute funds defines a subset of documents encompassed by the term substitute currency media.

15 As is known, the dimensions of a U.S. currency bill are about 2.5 inches x 6 inches (6.5 cm x 15.5 cm). All U.S. currency bills have the same dimensions, but in many foreign countries, the dimensions from one denomination to another varies. In addition, certain types of substitute currency media such as "EZ Pay" tickets have approximately the same dimensions of U.S. currency, however, it is understood that the dimensions of

20 substitute currency media may vary from type to type. The device 100 of the present invention according to any embodiment described herein is adapted to process documents having the same dimension or documents having varied dimensions.

Still referring to FIG. 1a, the transport mechanism 106 is adapted to transport the documents, one at a time, through the device 100 in the direction of arrow A, past the

25 currency detector 110 and the media detector 112, and to the output receptacle 108. The currency detector 110 is adapted to detect one or more predetermined characteristics on a currency bill or on a particular kind of substitute currency medium, such as a Disney Dollar, and the media detector 112 is adapted to detect one or more predetermined characteristics on a particular kind of substitute currency medium, such as a barcode on a

30 barcoded ticket, as explained in more detail in connection with FIG. 1b. The currency detector 110 comprises one or more sensors depending on a number of variables. The

variables relate to whether the device 100 is authenticating, counting, or discriminating denominations of currency bills, and what distinguishing characteristics of the currency bills are being examined, for example, size, thickness, color, magnetism, reflectivity, absorbability, transmissivity, electrical conductivity, serial number, and so forth. The
5 currency detector 110 may also employ a variety of detection means including, but not limited to, any combination of the following: a size detector, a density sensor, an upper optical scan head, a lower optical scan head, a single or plurality of magnetic sensors, a thread sensor, an infrared sensor, an ultraviolet/fluorescent light scan head, or an image scanner. These detection means and a host of others are disclosed in commonly assigned
10 U.S. Patent No. 6,278,795, entitled "Multi-Pocket Currency Discriminator," which is herein incorporated by reference in its entirety. Examples of discriminating denomination information from a currency bill are shown and disclosed in commonly assigned U.S. Patent No. 5,815,592, which is herein incorporated by reference in its entirety.

In the specific case of substitute currency media, the variables may also relate to
15 what distinguishing characteristics of the substitute currency media are being examined, such as any combination of the following without limitation: a barcode, a magnetic ink character recognition (MICR) pattern, characters readable by optical character recognition (OCR), including information printed according to the OCR-A and OCR-B fonts, a magnetic pattern, an optical variable device (OVD) pattern such as a hologram, a
20 magnetic or electrically conductive thread, conductive ink, magnetic ink, an electrically conductive polymer, perforations, a coded watermark, or other encoded information. The detection of these distinguishing characteristics may be carried out by the media detector 112, which, in alternate embodiments, may employ a variety of detection means including, but not limited to, any combination of the following: a barcode reader, an optical scan
25 head, a magnetic sensor, a thread sensor, an infrared sensor, an ultraviolet/fluorescent light scan head, or an image scanner. These detection means and a host of others are disclosed in commonly assigned U.S. Patent No. 6,278,795, entitled "Multi-Pocket Currency Discriminator," previously incorporated by reference, and may be modified in accordance with the present invention to detect distinguishing characteristics associated
30 with substitute currency media.

FIG. 1b shows a functional block diagram of a portion of an evaluation region 104 according to one embodiment of the present invention. The evaluation region 104 generally includes a currency detector 110, a media detector 112, and a controller 114. The evaluation region 104 may optionally include a second currency detector 122a and/or
5 a second media detector 124a which may be disposed on the opposite side of a transport mechanism 106 as shown in FIG. 1b. The currency detector 110 may include any combination of the detection means identified above. In the illustrated embodiment, the media detector 112 comprises a barcode reader 128 and a mirror 130. Barcode readers are well known in the art, and will not be described in detail herein. Generally, barcode
10 readers typically use a light beam generated by a laser diode or LED light source to illuminate a barcode label. The laser beam or LED beam is deflected in a certain pattern across the barcode label. The reflected light representing the light and dark bars on a barcode label are processed and then converted into a digital signal representing the barcode pattern. The digital signal is analyzed by a controller where the signal is decoded
15 into characters (e.g., alphanumerics and/or punctuation).

In one embodiment, the barcode reader 128 is an MS-911 barcode reader manufactured by Microscan. In alternate embodiments, other barcode readers may be employed, such as, for example, the LM 520, LazerData 8000, LazerData 9000E, or LD12000 barcode readers manufactured by PSC, Inc., the MS-880, MS-7100 or MS-
20 7180 barcode readers manufactured by Microscan, the Maxiscan 2100 or Maxiscan 3300 barcode readers manufactured by Intermec, or an LED barcode reader manufactured by Welch Allyn. It is understood that the present invention is not limited to any particular barcode reader. The selection of a particular barcode reader depends on a number of factors, including size constraints in the evaluation region 104 of the document processing
25 device, the particular barcode symbology to be scanned, and the desired scan rate. For example, the LazerData 9000E, manufactured by PSC, Inc., has scan rates ranging from 500 scans per second to 2000 scans per second, and is adapted to scan a linear barcode. The dimensions of the LazerData 9000E are approximately 3.84" (D) x 2.52" (L) x 2.52" (W), or 97.5 mm (D) x 64 mm (L) x 64 mm (W). The MS-911 barcode reader has
30 dimensions of approximately 3" (H) x 2.13" (W) x 1.63" (D), or 75 mm (H) x 53.5 mm (W) x 41 mm (D), and has a scan rate of up to 2000 scans per minute.

In alternate embodiments, the barcode reader 128 is adapted to scan at least 500 barcodes per minute, 800 barcodes per minute, 1000 barcodes per minute, 1200 barcodes per minute, and 1500 barcodes per minute.

In the illustrated embodiment shown in FIG. 1b, the controller 114 controls the operation of the barcode reader 128, but in alternate embodiments, a separate barcode controller (not shown) controls the operation of the barcode reader 128 and is coupled to the controller 114. The controller 114 also controls other operations of the document processing device.

Still referring to FIG. 1b, the media detector 112 optionally includes the barcode reader 128 and the mirror (not shown). The mirror is positioned proximate the barcode reader 128 to "lengthen" the effective distance between the barcode reader 128 and the document to be scanned, in applications where the barcode reader 128 is placed too close to the document. As is known, some barcode readers require that they be placed within a range of distance from the scanning surface. If the distance is outside the distance range specifications, the barcode reader cannot obtain reliable and accurate readings. In such applications, the mirror may be positioned to deflect the light beam from the barcode reader 128 onto the document passing along the transport path 106. In alternate embodiments in which the barcode reader 128 is positioned within distance range specifications, the mirror is not included.

Still referring to FIG. 1b, a currency bill 134 and a barcoded ticket 136 are shown on the transport mechanism 106. In one embodiment, the barcode encodes characters, such as numbers, which are associated with certain information. For example, on a casino cashout ticket, the barcode number may be associated with any combination of the following: a payout amount; a ticket number; identification information associated with the slot machine that dispensed the casino cashout ticket, such as, for example, the slot machine number, the time of dispensation, and the amount of payout from the dispensing slot machine during a time period; identification information associated with the winner of the casino cashout ticket; and so forth. On a gift certificate, the barcode number may be associated with any combination of the following: a gift amount; a gift certificate number; information about a retailer dispensing the gift certificate; terms and conditions information; and so forth. In an alternate embodiment, the barcode encodes a number

which is associated with a certain discount. For example, on a store coupon, the barcode number is typically associated with a promotional discount, such as fifty cents off, or buy one, get one free. The barcode numbers and their corresponding monetary and discount amounts are typically stored in a database. When the barcode number is scanned and identified, the corresponding amount or discount is queried from the database. The database may also include information indicative of whether a ticket has been redeemed. For example, to prevent fraudulent use of cashout tickets in the casino environment, the database may also keep track of whether a cashout ticket has been redeemed. In yet other embodiments, the barcode may encode any combination of numbers, letters, punctuation, or other characters. It is understood that a barcode in accordance with any embodiment shown or described herein may encode characters including any combination of numbers, letters, punctuation, or other characters.

Barcodes are well known in the art, and there are numerous barcode symbologies, such as, for example, Codabar, Code 3 of 9, Interleaved 2 of 5, UPC, EAN 8, EAN 13, Postnet, Planet Code, Aztec Code, Code 11, Code 16K, Code 49, Code 93, Code 128, Data Matrix, MaxiCode, 3D or bumpy barcode, to name just a few. These and other barcode symbologies encode characters such as numbers, letters, and/or punctuation. Barcodes can be linear, like the UPC code, 2-D like the MaxiCode, or 3-D like the bumpy barcode. Barcodes are typically black and white, but they may also be in color. In the illustrated embodiment of FIG. 1b, the barcode reader 128 is capable of scanning a linear barcode. A linear barcode typically comprises a series of parallel dark bars of varying widths with intervening light spaces, also of varying widths. It is expressly understood that the present invention is not limited to any particular barcode symbology or to any particular barcode reader. In alternate embodiments, multiple barcode readers may be disposed in the evaluation region 104 to identify different barcode symbologies. For example, a retailer may accept both store coupons and gift certificates, but the gift certificates may be encoded with a different barcode symbology than the store coupons. In such a case, the evaluation region 104 may include two barcode readers, one to identify barcodes disposed on the gift certificates, and one to identify barcodes disposed on the store coupons.

Still referring to FIG. 1b, the currency bill 134 and barcoded ticket 136 are transported along the transport mechanism 106 in the direction of arrow A. In the illustrated embodiment, the currency bill 134 and barcoded ticket 136 are first transported past the media detector 112 and then past the currency detector 110. However, in an alternate embodiment, a document may be first transported past the currency detector 110 and then past the media detector 112. Alternatively, the barcode reader 128 and the currency detector 110 may be incorporated into a single component, such as in a scanner that is adapted to scan one or more selected areas of a document or the entire area of a document. In this embodiment, the full image scanner scans for a characteristic associated with a currency bill and for a characteristic associated with a substitute currency medium.

As explained previously, the currency detector 110 may comprise one or more sensors disposed at various locations along the transport mechanism 106. In the alternative embodiment in which the barcode reader 128 is integrated into the currency detector 110, the barcode reader 128 may be positioned among the plurality of sensors at any location within the currency detector 110 and along the transport mechanism 106. Furthermore, as emphasized previously, the currency detector 110 may be disposed on either side or both sides of the transport mechanism 106.

If the barcode reader 128 does not identify a barcode on the currency bill 134, the barcode reader 128 provides a "no read" electrical signal to the controller 114 indicating that no barcode was read or identified in that scan. As used herein, a substitute currency medium having an unreadable or non-existent barcode may be considered an "invalid" substitute currency medium. In the illustrated embodiment of FIG. 1b, the transport mechanism 106 transports the currency bill 134 in the direction of arrow A towards the currency detector 110. The currency detector 110 evaluates one or more distinguishing characteristics, such as those specified above, of the currency bill 134. An optional second currency detector 122a disposed on the opposite side of the transport mechanism 106 may also evaluate one or more distinguishing characteristics of the currency bill 134.

In the direction of arrow A shown in FIG. 1b, the next document to be evaluated is the barcoded ticket 136. In FIG. 1b, the barcoded ticket 136 is scanned by the barcode reader 128. If the barcode reader 128 successfully reads the barcode 138 on the barcoded

ticket 136, the barcode reader 128 provides a "good read" electrical signal to the controller 114 indicating that the barcode reader 128 read or identified the barcode 138. As used herein, the term "valid substitute currency medium" refers to a document having a barcode identified by the barcode reader 128. The barcode reader 128 also provides an electrical signal representative of the barcode pattern 138 to the controller 114. The controller 114 decodes this electrical signal into characters, and stores these characters in memory which may optionally be integrated in the controller 114 or coupled to the controller 114.

In one embodiment, once the barcode reader 128 scans a valid barcode on the barcoded ticket 136, the controller 114 instructs the currency detector 110 to ignore the barcoded ticket 136. In an alternate embodiment, the controller 114 instructs the currency detector 110 to evaluate the barcoded ticket 136. In this alternate embodiment, if the controller 110 receives a signal from the media detector 124 that it has read a valid barcode and a signal from the currency detector 110 that it has detected an authentic currency, then the controller 114 provides an error signal to the operator alerting the operator that an unacceptable document has been detected. As used herein, the terms "operator," "user," and "customer" are interchangeable.

As stated above, the controller 114 may include a memory (not shown). In one embodiment, the memory includes master authenticating information. The master authenticating information includes information about authenticating characteristics of a currency bill, such as size, thickness, color, magnetism, reflectivity, absorbability, transmissivity, electrical conductivity, serial number, and so forth. The memory may also include master denomination information. The master denomination information includes information about denomination characteristics of a currency bill. Examples of such characteristics are disclosed in commonly assigned U.S. Patent No. 5,815,592, previously incorporated by reference. In another embodiment, the memory includes media information, which includes information about the substitute currency media. This information may include, in alternate embodiments, any combination of the following: an amount of money associated with a medium, a ticket number of a casino cashout ticket, the characters encoded on a barcode on a barcoded medium, self-checkout station identification information, casino gaming machine information, information about the

identity of the person redeeming the redeemable document, or the time a medium was dispensed, for example. In this embodiment, the media information may be periodically updated in the memory via a computer network coupled to the document processing device 100, such as described in connection with FIG. 11, or the media information may
5 be periodically updated in the memory via personnel, such as retailer or casino personnel. In the latter embodiment, an interface would be provided via the control unit 116 to the personnel to reprogram the memory. The memory may be random access memory, flash memory, EEPROM, or any other suitable rewriteable memory.

As explained above, the printer 120 may optionally be coupled to the device 100.
10 When the device 100 is coupled to the printer 120, the printer 120 may print reports containing information about the documents processed by the device 100, such as the reports described in connection with FIGS. 12-13 below. The printer 120 may dispense a redeemable document to an operator of the device 100. For example, as explained below, an operator may deposit a stack of documents containing a mixed combination of
15 currency bills and substitute currency media into the device 100. The device 100 processes the stack of documents, and, according to one embodiment, dispenses a barcoded ticket whose barcode is associated with the total value of documents processed. For example, an operator may deposit \$134 of currency bills into the device 100 and \$50 worth of redeemable documents. In this example, the device 100 would dispense a
20 barcoded ticket to the operator with a barcode associated with an amount of \$184. In another embodiment, the printer 120 prints both reports and dispenses redeemable documents.

The document processing device 100 shown and described in connection with FIGS. 1a and 1b represents but one of numerous embodiments into which the evaluation
25 region 104 may be incorporated. It is expressly understood that the document processing device 100 shown and described in connection with FIGS. 1a and 1b may be modified in accordance with numerous other embodiments. As explained next, the device 100 may be modified in accordance with any one or more of the following embodiments:

(1) a multi-pocket document processing device having a plurality of output
30 receptacles and incorporating any embodiment of the evaluation region 104 shown or described in connection with FIGS. 1a and 1b;

(2) a document processing device having a single output receptacle and incorporating any embodiment of the evaluation region 104 shown or described in connection with FIGS. 1a and 1b;

(3) a document processing device having dual output receptacles and
5 incorporating any embodiment of the evaluation region 104 shown or described in connection with FIGS. 1a and 1b;

(4) any of the foregoing embodiments (1) - (3) may be coupled to a coin sorting device;

(5) a funds processing device capable of processing both documents and coins and
10 incorporating any embodiment of the evaluation region 104 shown or described in connection with FIGS. 1a and 1b;

(6) any of the foregoing embodiments (1) - (5) may be communicatively coupled to a computer network, such as a casino gaming network or a retailer network; or

(7) any of the foregoing embodiments (1) - (6) may include a control unit for
15 receiving operator instructions and displaying information to an operator.

Document processing device having multiple output receptacles

As discussed above, according to one embodiment, the evaluation region 104 shown and described in connection with FIG. 1b is incorporated into a document
20 processing device having multiple output receptacles. In accordance with this embodiment, FIGS. 2 and 3 illustrate several views of a multi-pocket document processing device 200. A stack of currency bills and substitute currency media are provided to an input receptacle 202 in any order or in a predetermined order. The currency bills and substitute media may be facing one orientation or facing mixed
25 orientations. The currency bills and substitute currency media are fed, one by one, into a transport mechanism 206. The transport mechanism 206 transports currency bills and substitute currency media to one of a plurality of output receptacles 208a-208h, which may include upper output receptacles 208a, 208b, as well as lower output receptacles 208c-208h. Before a document reaches an output receptacle 208, the transport
30 mechanism 206 guides it through an evaluation region 204 where a document can be, for example, analyzed, authenticated, denominated, counted, validated, and/or otherwise

processed. In alternative embodiments of the device 200, the evaluation region 204 can determine document orientation, document size, or whether documents are stacked upon one another. The results of the above process or processes may be used to determine to which output receptacle 208 a document is directed. The illustrated embodiment of the document processing device 200 has an overall width, W_1 , of approximately 4.87 feet (1.46 meters), a height, H_1 , of approximately 4.85 feet (1.45 meters), and a depth, D_1 , of approximately 1.67 feet (0.50 meters).

In one embodiment, documents are transported, scanned, denominated, authenticated, validated, and/or otherwise processed at a rate equal to or greater than 600 bills per minute. In another embodiment, documents are processed at a rate equal to or greater than 800 bills per minute. In another embodiment, documents are processed at a rate equal to or greater than 1000 bills per minute. In still another embodiment, documents are processed at a rate equal to or greater than 1200 bills per minute. In yet another embodiment, documents are processed at a rate equal to or greater than 1500 bills per minute.

In the illustrated embodiment, interposed in the transport mechanism 206, intermediate the evaluation region 204 and the lower output receptacles 208c-208h, is a document facing mechanism designated generally by reference numeral 203. The document facing mechanism 203 is capable of rotating a document (*i.e.*, a currency bill or substitute currency medium) 180° so that the face position of the document is reversed. That is, if a U.S. currency bill, for example, is initially presented with the surface bearing a portrait of a president facing down, it may be directed to the document facing mechanism 203, whereupon it will be rotated 180° so that the surface with the portrait faces up. The leading edge of the document remains constant while the document is being rotated 180° by the document facing mechanism 203. The decision may be taken to send a document to the document facing mechanism 203 when the selected mode of operation or other operator instructions call for maintaining a given face position of documents as they are processed by the device 200. For example, it may be desirable in certain circumstances for all of the currency bills ultimately delivered to the lower output receptacles 208c-208h to have the currency bill surface bearing the portrait of the president facing up. In such embodiments of the device 200, the evaluation region 204 is capable of determining the

face position of a bill, such that a bill not having the desired face position can first be directed to the document facing mechanism 203 before being delivered to the appropriate output receptacle 208. Further details of a document facing mechanism which may be utilized for this purpose are disclosed in commonly assigned U.S. Patent No. 6,074,334, 5 entitled "Document Facing Method and Apparatus," which issued on June 13, 2000, incorporated herein by reference in its entirety, and may be employed in conjunction with the present invention such as the device illustrated in FIGS. 2 and 3. Another document facing mechanism which may be employed in another embodiment is disclosed in commonly assigned U.S. Patent 6,371,303 entitled "Two Belt Bill Facing Mechanism". 10 Alternative embodiments of the device 200 do not include the document facing mechanism 203.

The document processing device 200 in FIG. 2 may be controlled from a separate control unit 216 which has a display/user-interface 217. In one embodiment of the present invention, the display/user-interface 217 incorporates a touch panel display which 15 displays information including "functional" keys when appropriate. The display/user-interface 217 may be a full graphics display. Alternatively, additional physical keys or buttons, such as a keyboard 219, may be employed. The control unit 216 may be a self-contained desktop or laptop computer which communicates with the device 200 via a cable 221. In one embodiment, the device 200 includes a suitable communications port 20 (not shown) for this purpose. In another embodiment, the control unit 216 communicates with the device 200 wirelessly via a wireless modem (not shown). In embodiments in which the control unit 216 is a desktop computer wherein the display/user-interface 217 and the desktop computer are physically separable, the desktop computer may be stored within a compartment 225 of the device 200. In other alternative embodiments, the 25 control unit 216 is integrated into the device 200 so that the control unit 216 is contained within the device 200. In this embodiment, the display/user-interface 217 may comprise a touch screen or touch panel display that is coupled to the device 200.

The operator can control the operation of the device 200 through the control unit 216. By selecting various user-defined modes through the control unit 216, such as via an 30 input device such as a keyboard 219, or a switch, button, or touch screen (not shown), the operator can direct currency bills and substitute media into specific output receptacles,

such as output receptacles 208a-208h. Note that fewer or more output receptacles may be employed in alternate embodiments. In still other embodiments, the user can select pre-programmed modes or create new user-defined modes based on the particular requirements of the application. For example, the operator may select a user-defined mode which instructs the device 200 to sort currency bills by denomination; accordingly, the evaluation region 204 would denominate the bills and direct one dollar bills into the first lower output receptacle 208c, five dollar bills into the second lower output receptacle 108d, ten dollar bills into the third lower output receptacle 208e, twenty dollar bills into the forth lower output receptacle 208f, fifty dollar bills into the fifth lower output receptacle 208g, and one-hundred dollar bills into the sixth lower output receptacle 208h. The operator may also instruct the device 200 to deliver those bills whose denomination was not determined, *i.e.*, no call bills, to the first upper output receptacle 208a. In such an embodiment, the upper output receptacle 208a would function as a reject pocket. In an alternative embodiment, the operator may instruct the device 200 to also evaluate the authenticity of each currency bill. In such an embodiment, authentic bills would be directed to the appropriate lower output receptacles 208c-208h. Those bills that were determined not to be authentic, *i.e.*, suspect bills, would be delivered to the second upper output receptacle 208b. A multitude of user defined modes are disclosed in commonly assigned U.S. Patent No. 6,278,795, previously incorporated by reference, which may be employed in conjunction with the present invention such as the device illustrated in FIGS. 2 and 3.

It should be noted that the control unit 216 provides the operator with a broad range of flexibility in selecting which output receptacles receive which documents. For example, the operator may instruct the device 200 to sort the currency bills by denomination and to deliver authentic currency bills according to their denomination into selected ones of the output receptacles 208c-208h. The operator may further instruct the device 200 to deliver no call bills and suspect bills into output receptacle 208a, and to deliver substitute currency media into output receptacle 208b. In addition, the device 200 may be unable to evaluate a particular document because, for example, it is damaged or excessively worn. The operator may instruct the device 200 to deliver any substitute currency media that cannot be evaluated to the output receptacle 108a. Alternatively,

additional output receptacles (not shown) may be employed to receive any combination of no call bills, suspect bills, valid substitute currency media, or invalid substitute currency media. The delivery of such documents may occur without suspension of operation of the device 200, or with suspension of the operation of the device 200, as explained next.

5 According to one embodiment, the device 200 is configured so that when the evaluation region 204 is unable to identify certain criteria regarding a currency bill or substitute currency medium, the unidentified document is flagged and "presented" in one of the output receptacles 208a-208h, that is, the transport mechanism 206 is suspended or halted so that the unidentified document is located at a predetermined position within one
10 of the output receptacles 208a-208h, such as being the last document transported to one of the output receptacles. In the case of currency bills, such criteria can include denominating information, authenticating information, information indicative of the currency bill's series, or other information the evaluation region 204 is attempting to obtain pursuant to a mode of operation. In the case of substitute currency media, such
15 criteria may include, in addition to or exclusive of the criteria mentioned above, whether information, such as a valid barcode, is detected on the substitute currency media.

The user may determine in which output receptacle 208a-208h the flagged document is presented according to a selected mode of operation. For example, where the unidentified document is the last document transported to an output receptacle 208a-
20 208h, it may be positioned within a stacker wheel or positioned at the top of the documents already within the output receptacle 208a-208h. While unidentified documents may be transported to any output receptacles 208a-208h, it may be more convenient for the operator to have unidentified documents transported to one of the upper output receptacles 208a,b, which are positioned such that the operator is able to
25 easily see and/or inspect the document which has not been identified by the evaluation region 204. The operator may then either visually inspect the flagged document while it is resting on the top of the stack, or the operator may decide to remove the document from the output receptacle 208 in order to examine the flagged document more closely. In an alternative embodiment of the device 200, the control unit 216 may communicate to the
30 user via the display/user-interface 217 information identifying which one of the output receptacles 108a-108h a flagged document is presented.

The device 200 may be adapted to continue operation automatically when a flagged document is removed from the upper output receptacle 208a,b or, according to one embodiment of the present invention, the device 200 may be adapted to suspend or halt operation and require input from the operator via the control unit 216. Upon examination of a flagged document by the operator, it may be found that the flagged document is genuine or valid even though it was not identified as such by the evaluation region 204 or the evaluation region 204 may have been unable to denominate the flagged document. However, because the document was not identified, the total value and/or denomination counters will not reflect its value. According to one embodiment, such an unidentified document is removed from the output receptacles 208 and reprocessed or set aside. According to another embodiment, the flagged documents may accumulate in the upper output receptacles 208a,b until the batch of documents currently being processed is completed or the output receptacle 208a,b is full and then reprocessed or set aside. In yet another embodiment, the control unit 216 of the device 200 includes denomination keys, such as disclosed in commonly assigned U.S. Patent No. 5,790,697, which is herein incorporated by reference in its entirety. Upon inspection of a flagged currency bill, such as a no call bill, the operator may manually key in the denomination of the bill via a denomination key, and resume operation. In the case of a substitute currency media, the operator may manually enter into the device 200 via the control unit 216 information about the substitute currency media. Such information may include the barcode number when the substitute currency media is a barcoded ticket, the "denomination" of the substitute currency media, such as a \$5 Disney Dollar, the value associated with the barcoded ticket, such as \$100, and other identifying information.

According to another embodiment, when a document is flagged, the transport mechanism may be stopped before the flagged document is transported to one of the output receptacles. Such an embodiment is particularly suited for situations in which the operator need not examine the document being flagged; for example, the device 200 is instructed to first process United States currency and then British currency pursuant to a selected mode of operation where the device 200 processes United States \$1, \$5, \$10, \$20, \$50, and \$100 currency bills into the lower output receptacles 208c-208h, respectively. Upon detection of the first British pound note, the device 200 may halt

operation allowing the operator to empty the lower output receptacles 208c-208h and to make any spatial adjustments necessary to accommodate the British currency. A multitude of modes of operation which may be employed in conjunction with the present invention are described in conjunction with bill flagging, presenting, and/or transport
5 halting in commonly assigned U.S. Patent No. 6,311,819 entitled "Method and Apparatus for Document Processing," which is herein incorporated by reference in its entirety.

In the illustrated embodiment, with regard to the upper output receptacles 208a and 208b, the second upper output receptacle 208b is provided with a stacker wheel 227 for accumulating a number of documents, while the first upper output receptacle 208a is
10 not provided with such a stacker wheel. Thus, when, pursuant to a preprogrammed mode of operation or a user-selected mode or other operator instructions, a document is to be fed to the first upper output receptacle 208a, there may be a further instruction to momentarily suspend operation of the device 200 for the operator to inspect and remove the document. On the other hand, it may be possible to allow a number of documents to
15 accumulate in the first upper output receptacle 208a before operation is suspended or halted. Similarly, the second upper output receptacle 208b may be utilized initially as an additional one of the lower output receptacles 208c-208h. However, in the illustrated embodiment shown in FIG. 2, there is no storage cassette associated with the second upper output receptacle 208b. Therefore, when the second upper output receptacle 208b
20 is full, operation may be suspended to remove the documents at such time as yet further documents are directed to the second upper output receptacle 208b in accordance with the selected mode of operation or other operator instructions. According to an alternative embodiment of the device 200, both the first and the second upper output receptacles 208a, 208b are equipped with a stacker wheel. According to such an embodiment both
25 the upper output receptacles 208a, 208b may also function as the lower output receptacle 208c-208h, thereby allowing a number of documents to be stacked therein. In yet another embodiment, the first upper output receptacle 208a and the second upper output receptacle 208b are not provided with a stacker wheel 227.

FIGS. 4a and 4b illustrate the evaluation region 204 according to one embodiment
30 of the device 200. The evaluation region 204 can be opened for service, access to sensors, to clear document jams, *etc.*, as shown in FIG. 4a. Additional details of the

evaluation region 204 are provided with reference to the evaluation region 104 shown and described in FIG. 1b. As previously explained, the evaluation region 204 shown in FIG. 4a may employ any combination of the following detection means without limitation in one or more alternate embodiments: a size detection and density sensor 408, a lower optical scan head 410, an upper optical scan head 412, a single or multitude of magnetic sensors 414, a thread sensor 416, an infrared sensor (not shown), an ultraviolet/fluorescent light scan head 418, an upper media detector 403a, or a lower media detector 403b. As noted in connection with FIG. 1b, these detection means may be disposed in any order and on either or both sides of the transport plate 400 without departing from the present invention. These detection means and a host of others are disclosed in commonly assigned U.S. Patent No. 6,278,795, entitled "Multi-Pocket Currency Discriminator," previously incorporated by reference. As noted above, in the specific case of substitute currency media, the variables may also relate to what distinguishing characteristics of the substitute currency media are being examined, such as any combination of the following without limitation: a barcode, a MICR pattern, OCR-readable information, including information printed according to the OCR-A and OCR-B fonts, a magnetic pattern, an OVD pattern such as a hologram, a magnetic thread or an electrically conductive thread, conductive ink, or an electrically conductive polymer.

The direction of document travel through the evaluation region 204 is indicated by arrow A in FIG. 4a. The documents (*i.e.*, currency bills and/or substitute currency media) are positively driven along a transport plate 400 through the evaluation region 204 by means of a transport roll arrangement comprising both driven rollers 402 and passive rollers 404. The rollers 402 are driven by a motor (not shown) via a belt 401. Passive rollers 404 are mounted in such a manner as to be freewheeling about their respective axis and biased into counter-rotating contact with the corresponding driven rollers 402. The driven and passive rollers 402, 404 are mounted so that they are substantially coplanar with the transport plate 400. The transport roll arrangement also includes compressible rollers 406 to aid in maintaining the documents flat against the transport plate 400. Maintaining the document flat against the transport plate 400 so that the document lies flat when transported past the sensors enhances the overall reliability of the evaluation processes. A similar transport arrangement is disclosed in commonly-owned United

States Patent No. 5,687,963, entitled "Method and Apparatus for Discriminating and Counting Documents," which is incorporated herein by reference in its entirety.

Additional details concerning the input receptacle 202, transport mechanism 206, and diverters 237 are disclosed in commonly assigned U.S. Patent Number 6,398,000, entitled "Currency Handling System Having Multiple Output Receptacles," which is
5 herein incorporated by reference in its entirety.

Referring back to FIG. 2, the illustrated embodiment of the device 200 includes a total of six lower output receptacles 208c-208h. More specifically, each of the lower output receptacles 208c-208h includes a first portion designated as an escrow compartment 205a-205f and a second portion designated as a storage cassette 207a-207f.
10 Typically, documents are initially directed to the escrow compartments 205, and thereafter at specified times or upon the occurrence of specified events, which may be selected or programmed by an operator, documents are then fed to the storage cassettes 207. The storage cassettes 207 are removable and replaceable, such that stacks of
15 documents totaling a predetermined number of documents or a predetermined monetary value may be accumulated in a given storage cassette 207, whereupon the cassette may be removed and replaced with an empty storage cassette. In the illustrated embodiment, there are six lower output receptacles 208c-208h which include escrow compartments 205 and storage cassettes 207a-207f. In alternative embodiments, the device 200 may
20 contain more or less than six lower output receptacles which include escrow compartments 205 and storage cassettes 207. In other alternative embodiments, modular lower output receptacles 208 may be implemented to add many more lower output receptacles to the device 200. Each modular unit may comprise two lower output receptacles. In other alternative embodiments, several modular units may be added at one
25 time to the device 200.

A series of diverters 237a-237f, which are a part of the transport mechanism 206, direct the documents to one of the lower output receptacles 208c-208h. When the diverters 237 are in an upper position, the documents are directed to the adjacent lower output receptacle 208. When the diverters 237 are in a lower position, the documents
30 proceed in the direction of the next diverter 237. Alternatively, the operator may instruct the device 200 to direct substitute currency media to one or more of the upper output

receptacles 208a-208b such that only currency bills are presented to the diverters 237a-237f.

Additional details concerning the lower output receptacles 208c-208h, the escrow compartments 205, and the storage cassettes 207 are disclosed in commonly assigned
5 U.S. Patent Number 6,398,000, entitled "Currency Handling System Having Multiple Output Receptacles," incorporated by reference above. It should be emphasized that the operator may also instruct the device 200 to direct substitute currency media to one or more of the lower output receptacles 208. In the illustrated embodiment, only currency bills are directed to the lower output receptacles 208, however, in alternative
10 embodiments, substitute currency media could also be directed to one or more of the lower output receptacles 208.

In an alternative embodiment, the device 200 is dimensioned to process a stack of different sized currencies at the same time. In yet another embodiment, the device 200 can also be dimensioned to process a stack of different sized currencies and substitute
15 currency media at the same time. For example, one application may require the processing of United States dollars (2.5 inches x 6 inches, 6.5 cm x 15.5 cm) and French currency (as large as 7.17 inches x 3.82 inches, 18.2 cm x 9.7 cm). The application may simply require the segregation of the U.S. currency from the French currency wherein the device 200 delivers U.S. currency to the first lower output receptacle 208c and the French
20 currency to the second output receptacle 208d. In another alternative embodiment, the device 200 processes a mixed stack of U.S. ten and twenty dollar bills and French one hundred and two hundred Franc notes wherein the currency documents are denominated, counted, and authenticated. In that alternative embodiment, the U.S. ten and twenty dollar bills are delivered to the first 208c and second 208d lower output receptacles,
25 respectively, and the French one hundred and two hundred Franc notes are delivered to the third 208e and fourth 208f lower output receptacle, respectively. In other alternative embodiments, the device 200 denominates, counts, and authenticates six different types of currency wherein, for example, Canadian currency is delivered to the first lower output receptacle 208c, United States currency is delivered to the second output receptacle 208d,
30 Japanese currency is delivered to the third lower output receptacle 208e, British currency is delivered to the fourth lower output receptacle 208f, French currency is delivered to the

fifth lower output receptacle 208g, and German currency is delivered to the sixth lower output receptacle 208h. In yet another embodiment, no call bills or other denominations of foreign currency, such as Mexican currency for example, may be directed to the second upper output receptacle 208b. In still another embodiment, suspect bills are delivered to
5 the first upper output receptacle 208a. In another alternate embodiment, U.S. currency and cashout tickets are delivered to different output receptacles. These embodiments represent just a few examples of the numerous combinations of U.S. currency bills, foreign currency bills, and substitute media that can be delivered to the output receptacles 208.

10 Additional details concerning the processing of foreign currency are disclosed in commonly assigned U.S. Patent Number 5,875,259, entitled "Method and Apparatus for Discriminating and Counting Documents" (Canadian and German currency) and U.S. Patent Number 5,960,103, entitled "Method and Apparatus for Authenticating and Discriminating Currency" (British currency); each of which is incorporated herein by
15 reference in its entirety.

In other alternative embodiments of the device 200, the user can vary the type of documents delivered to the output receptacles 208. For example, in one alternative embodiment an operator can direct, via the control unit 216 (shown in FIG. 2), that a stack of one, five, ten, twenty, fifty, and one-hundred United States dollar bills be
20 denominated, counted, authenticated, and directed into lower output receptacles 208c-208h, respectively. In still another alternative embodiment, the device 200 is also instructed to deliver other currency bills, such as a United States two dollar bill or foreign currency bills that have been mixed into the stack of documents, to the second upper output receptacle 208b. In still another alternative embodiment, the device 200 is also
25 instructed to count the number and aggregate value of all the currency bills processed and the number and aggregate value of each individual denomination of currency bills processed. These values may be communicated to the user via the display/user-interface 217 of the device 200. In addition, or alternatively, these values are communicated to a remote device via a communications port (not shown).

30 In still another alternative embodiment, no call bills and bills that are stacked upon one another are directed to the second upper output receptacle 208b. In still another

alternative embodiment, the operator can direct that all documents failing an authentication test be delivered to the first upper output receptacle 208a. In another alternative embodiment, the operator instructs the device 200 to deliver no call bills, suspect bills, stacked bills, *etc.* to one of the lower output receptacles 208c-208h. In yet
5 another alternative embodiment, the currency bills are directed to one or more of the lower output receptacles 208c-208h, no call bills and suspect bills are directed to the upper output receptacle 208a, and substitute currency media are directed to the upper output receptacle 208b. In another alternate embodiment, U.S. currency bills are directed to selected ones of the lower output receptacles 208, foreign currency bills are directed to
10 other lower output receptacles 208, no call bills, suspect bills, and invalid substitute currency media (*i.e.*, media which cannot be identified) are directed to the first upper output receptacle 208a, and valid substitute currency media are directed to the second upper output receptacle 208b. Alternatively, a third upper output receptacle (not shown) may receive invalid substitute currency media so as to keep all substitute currency media
15 separate from currency bills.

In still another alternate embodiment, genuine U.S. currency bills and foreign currency bills and identified substitute currency are directed to selected ones of the lower output receptacles 208, unidentified substitute currency media are directed to the first upper output receptacle 208a, and no call currency bills and suspect currency bills are
20 directed to the second upper output receptacle 208b. In short, the device 200 as illustrated having eight output receptacles 208a-208h provides a great deal of flexibility to the operator. And in other alternative embodiments of the currency handling device 200 with a fewer or greater number of output receptacles 208, numerous different combinations for processing documents are available. What output receptacle receives
25 which type of document, whether a U.S. currency bill, a foreign currency bill, or a substitute currency medium, is entirely customizable by the operator.

In the illustrated embodiment shown in FIG. 2, the various operations of the device 200 are controlled by processors disposed on a number of printed circuit boards (PCBs) located throughout the device 200. Further details concerning the PCBs are
30 disclosed in commonly assigned U.S. Patent Number 6,398,000, entitled "Currency

Handling System Having Multiple Output Receptacles," previously incorporated by reference.

Document processing device having a single output receptacle

The evaluation region 104 shown and described in connection with FIGS. 1a and 1b can also be incorporated into a document processing device having a single output receptacle. FIGS. 5 and 6 illustrate a compact document processing device 500 according to one embodiment of the present invention. This device 500 is shown and described in more detail in commonly assigned United States Patent No. 5,687,963 which is incorporated by reference in its entirety. In one embodiment, the device 500 is modified to include an evaluation region 104 as shown and described in connection with FIG. 1b. Documents are fed, one by one, from a stack of documents placed in an input receptacle 502 onto a transport mechanism. The transport mechanism includes a transport plate or guide plate 606 for guiding a document to an output receptacle 608. Before reaching the output receptacle 508, the document can be, for example, evaluated, analyzed, counted and/or otherwise processed by an evaluation region 604. In one embodiment of the device 500, documents are processed at a rate in excess of 600 documents per minute. In another embodiment, documents are processed at a rate in excess of 800 documents per minute. In yet another embodiment, documents are processed at a rate in excess of 1000 documents per minute. In another embodiment, documents are processed at a rate in excess of 1200 documents per minute. In still another embodiment, documents are processed at a rate in excess of 1500 documents per minute.

The device 500 in FIG. 5 has a touch panel display 516 in one embodiment of the present invention which displays "functional" keys when appropriate. The touch panel display 516 simplifies the operation of the device 500. Alternatively or additionally physical keys, switches, or buttons may be employed, such as, for example, a keypad. In one embodiment, the touch panel display 516 includes denomination keys, such as disclosed in commonly assigned U.S. Patent No. 5,790,697, previously incorporated by reference. The operator may also manually enter, via the touch panel display 516, information about the substitute currency media, such as the information described above in connection with FIGS. 2-3.

A pair of driven stacking wheels 527a and 527b are located in the output receptacle 508 and come into contact with the documents as the documents are transported into the output receptacle 508. The stacking wheels 527a and 527b are supported for rotational movement about respective shafts journaled on a rigid frame and
5 driven by a motor (not shown). Flexible blades of the stacker wheels 527a and 527b deliver the documents onto a forward end of a stacker plate 652 shown in FIG. 6. In an alternate embodiments, the device 500 includes a stacking wheel 527a only, a stacking wheel 527b only, or neither a stacking wheel 527a nor a stacking wheel 527b.

According to one embodiment, the document scanning device 500 is compact,
10 having a height (H_1) of about 9 ½ to 10 ½ inches, width (W_1) of about 10 ¾ to 11 ¾ inches, and a depth (D_1) of about 12 to 16 inches.

Like the device 200 shown and described in connection with FIGS. 2-4b, the device 500 shown and described in connection with FIGS. 5, 6 is adapted to halt or suspend operation when a no call or a suspect bill or an invalid substitute currency
15 medium is detected. An operator of the device 500 may specify via the touch panel display 516 the location of the unidentified document, such as the last document to be presented to the output receptacle 508 before operation is halted or suspended. The operator may further manually enter information about the invalid substitute currency medium, such as the information described above in connection with FIGS. 2-3. In an
20 embodiment in which the device 500 includes denomination keys, the operator may select one of the denomination keys after inspection of a no call bill or a suspect bill, and resume operation as if the no call bill or suspect bill had not been flagged.

Document processing device having dual output receptacles

FIGS. 7a and 7b illustrate an exterior perspective view and a side cross-sectional
25 view, respectively, of a compact, document processing device 700 having dual output receptacles. The process for carrying documents through the device 700 is the same as discussed above, except that the device 700 has first and second output receptacles, 708a, 708b, respectively. A diverter 760, shown in FIG. 7b, directs the documents to either the first or second output receptacle 708a, 708b. When the diverter 760 is in a lower
30 position, documents are directed to the first output receptacle 708a. When the diverter 760 is in an upper position, documents proceed in the direction of the second output

receptacle 708b. Details of devices with multiple output receptacles are described in WO 97/45810 which is incorporated by reference in its entirety.

FIG. 7b shows a pair of stacker wheels 727a, 727b for delivering documents to the first and second output receptacles 708a, 708b. However, in alternate embodiments, the device 700 includes the stacker wheel 727a only, the stacker wheel 727b only, or
5 neither the stacker wheel 727a nor the stacker wheel 727b.

The device 700 includes an evaluation region 704, such as the evaluation region 104 shown and described in connection with FIGS. 1a and 1b.

According to one embodiment the device 700 is compact having a height (H_2) of
10 about $17 \frac{1}{2}$ inches, width (W_2) of about $13 \frac{1}{2}$ inches, and a depth (D_2) of about 15 inches. According to another embodiment, the device 700 has dimensions of: a height (H_2) of about 18 inches; a width (W_2) of about $13 \frac{3}{4}$ inches; and a depth (D_2) of about 16 inches. The device 700 may be rested upon a tabletop, countertop, desk, or the like.

Like the embodiments described above in connection with a device having
15 multiple output receptacles, the device 700 may be instructed by an operator via a control unit 716, which may include a touch panel display or other suitable interface, to direct certain documents to one or the other of the first and second output receptacles 708a, 708b. These modes may be pre-programmed or operator-defined. For example, according to one embodiment, genuine currency bills and valid substitute currency media
20 are directed to the first output receptacle 708a, whereas non-genuine currency bills and invalid substitute currency media are directed to the second output receptacle 708b. According to another embodiment, genuine currency bills are directed to the first output receptacle 708a, valid substitute currency media are directed to the second output receptacle 708b, and the device 700 is programmed to halt or suspend operation when a
25 non-genuine currency bill or invalid substitute currency medium is detected by the evaluation region of the device 700. In one embodiment, the control unit 716 may include denomination keys, such as explained above. The control unit 716 may also be adapted to permit the operator to manually enter information about a flagged substitute currency medium, such as the information described above in connection with FIGS. 2-3.

In another embodiment, the evaluation region 104 shown and described in connection with FIGS. 1a and 1b may be employed in a document processing device according to any of the embodiments just described which is coupled to a coin sorting device. In different embodiments, the coin sorting device is adapted to sort coins only or
5 a combination of coins and tokens.

FIG. 8 illustrates a functional block diagram of a document processing device 800 coupled to a coin sorting device 8000 in accordance with one embodiment of the present invention. The document processing device 800 includes a communications port 818 and a controller 814, and is communicatively coupled to the coin sorting device 8000 via a
10 cable 876. The coin sorting device 8000 includes a communications port 8018 and a controller 8014. The communications ports 818, 8018 may be any suitable communications port such as a serial or parallel port, USB port, and the like. In an alternate embodiment, the document processing device 800 and the coin sorting device 8000 communicate wirelessly, and the cable 876 is not included. In this alternate
15 embodiment, the communications ports 818, 8018 are adapted to receive and transmit information wirelessly.

An operator places a stack of documents into the document processing device 800 for processing, and places a plurality of coins and/or tokens into the coin sorting device 8000 for sorting and counting. The document processing device 800 processes the stack
20 of documents, and the controller 814 in the document processing device 800 stores information representative of the documents being processed, such as the denomination of the currency bills, the value of the substitute currency media, the number of non-genuine currency bills, the number of invalid substitute currency media, and so forth. The coin sorting device 8000 sorts and counts the coins or tokens, and the controller 8014 in the
25 coin sorting device 8000 stores information representative of the coins or tokens being sorted and counted, such as the value and denomination of the coins (penny, dime, nickel, *etc.*), the number and kind of tokens, and so forth.

In one embodiment, the stored information in the coin sorting device 8000 is transmitted to the controller 814 of the document processing device 800. The document
30 processing device 800 organizes and presents the combined information to the operator via a display, such as a monitor or touch screen. In another embodiment, the stored

information in the document processing device 800 is transmitted to the controller 8014 of the coin sorting device 8000, which organizes and presents the information combined from both devices to the operator via a display, such as a monitor or touch screen.

Referring now to FIG. 9, there is shown a coin sorter system 9000. The coin
5 sorter system 9000 includes a coin tray 9002 which receives coins of mixed denominations. The coins are sorted, counted, and are captured in a plurality of coin bins 9008 positioned on the exterior of the coin sorter system 9000. In an alternate embodiment, the coins are captured in a plurality of coin bags.

The coin sorter system 9000 includes a control panel 9016. In the illustrated
10 embodiment, the control panel 9016 includes a display 9076 for displaying information about the coin sorter system 9000 and a plurality of keys 9078 for allowing the operator to enter information to the coin sorter system 9000. In an alternate embodiment, the control panel 9016 includes a touch screen.

Additional details concerning the coin sorter system 9000 are disclosed in
15 commonly assigned U.S. Patent Number 6,139,418, entitled "High Speed Coin Sorter Having a Reduced Size," and U.S. Patent Number 5,997,395, entitled "High Speed Coin Sorter Having a Reduced Size," each of which is herein incorporated by reference in its entirety. In one embodiment, the coin sorter system 9000 shown in FIG. 9 is modified to include a communications port such as the communications port 8018 one described in
20 connection with FIG. 8. The coin sorter system 9000 may be further modified to perform the coin sorting and authenticating functions disclosed in U.S. Patent Nos. 5,299,977, 5,453,047, 5,507,379, 5,542,880, 5,865,673 and 5,997,395, each of which is herein incorporated by reference in its entirety.

Funds processing machine

25 In another embodiment, the evaluation region 104 of FIG. 1b may be incorporated into a funds processing machine capable of processing both documents and coins.

Referring now to FIG. 10a, a funds processing machine 1000 includes a touch
screen 1016 to provide inputs from a user and to display outputs to be viewed by the user. While the touch screen 1016 is the preferred mode to enter data from the user, the funds
30 processing machine 1000 may also include a mechanical keyboard, in addition to or in lieu of the touch screen 1016, to receive such inputs.

The funds processing machine 1000 includes a coin receptacle 1044 which receives coins of a single denomination or of mixed denominations from a user. Additionally, an input receptacle 1002 is included within the funds processing machine 1000. The input receptacle 1002 is illustrated in its open position in FIG. 10a and may be retracted by the funds processing machine 1000 once the bulk currency has been placed therein by the user. These input devices 1044 and 1002 allow the user of the funds processing machine 1000 to input his or her funds which will ultimately be converted to some other sort of fund source that is available to the user. In addition to banknotes, the input receptacle 1002 of the funds processing machine 1000 can also accommodate casino script, paper tokens, or bar coded tickets.

The funds processing machine 1000 includes a dispenser 1008a and a dispensed coin receptacle 1046 for dispensing to the user the desired amount of funds in both bank notes and coins. A return slot 1008b may also be included within the funds processing machine 1000 to return currency bills or substitute currency media to the user which cannot be authenticated or otherwise processed. Coins which cannot be authenticated may be returned to the user via the dispensed coin receptacle 1046. The funds processing machine 1000 further includes a document dispenser 1020 for providing a user with a receipt of the transaction that he or she has performed.

In its simplest form, the funds processing machine 1000 receives funds (currency, coins, substitute currency media) via the coin input receptacle 1044 and the input receptacle 1002, and after these deposited funds have been authenticated and counted, the funds processing machine 1000 returns to the user an amount equal to the deposited funds but in a different variation of bank notes and coins. For example, the user of the funds processing machine 1000 may input \$102.99 in various small bank notes and pennies and in turn receive a \$100 bank note, two \$1 bank notes, three quarters, two dimes, and four pennies. Alternatively, the funds processing machine 1000 may simply return a receipt of the transaction or a barcoded ticket through the document dispenser 1020 which the user can redeem for funds by an attendant of the funds processing machine 1000. Alternatively, the funds processing machine 1000 can credit a user's account.

The funds processing machine 1000 may also include a media reader slot 1042 into which the user inserts his or her identification card so that the funds processing

machine 1000 can identify the user. The touch screen 1016 typically provides the user with a menu of options which prompts the user to carry out a series of actions for identifying the user by displaying certain commands and requesting that the user depress touch keys on the touch screen 1016 (*e.g.*, a user PIN). The funds processing machine
5 1000 includes a card media reader device which is capable of reading from or writing to one or more types of card media. This media may include various types of memory storage technology such as magnetic storage, solid state memory devices, and optical devices.

FIG. 10b illustrates the funds processing machine 1000 in a side view illustrating
10 the various modules. The document processing module 1004 receives documents from the input receptacle 1002 for processing. The inward movement of the input receptacle 1002 positions a stack of documents at the feed station of the document scanning and counting device which automatically feeds, counts, scans, authenticates, and sorts the documents, one at a time at a high rate of speed (*e.g.*, at least 350 documents per minute).
15 In place of or in addition to the input receptacle 1002, the funds processing machine 1000 may include a single document receptacle which receives and processes one document at a time. The documents that are recognized by the document processing module 1004 are delivered to a storage area such as a currency canister (not shown). When a document cannot be recognized by the document processing module 1004, it is returned to the
20 customer through the return slot 1008b. Exemplary machines which scan, sort, count, and authenticate currency bills as required by the bank note processing module are described in U.S. Patent Nos. 5,295,196, 5,870,487 and 5,875,259, each of which is incorporated by reference herein in its entirety.

In place of or in addition to the input receptacle 1002, the funds processing
25 machine 1000 may include an input receptacle slot which receives and processes one document at a time. Such an input receptacle slot would be placed at the front of the funds processing machine 1000.

Additional details of the funds processing machine 1000 are disclosed in commonly assigned, co-pending U.S. Patent Number 6,318,537, entitled "Currency
30 Processing Machine with Multiple Internal Coin Receptacles," which is herein incorporated by reference in its entirety.

In accordance with the present invention, the document processing module 1004 of the funds processing machine 1000 shown in FIG. 10b and described in U.S. Patent No. 6,318,537 is modified to incorporate the evaluation region 104 shown and described in connection with FIGS. 1a and 1b. The user deposits currency bills and substitute
5 currency media into the input receptacle 1002. As described in more detail below, the funds processing machine 1000 may be communicatively coupled to a casino gaming network. In such an embodiment, a casino customer may deposit a stack of casino cashout tickets and currency bills into the input receptacle 1002, and the machine 1000 queries the casino gaming network for the payout amounts associated with the casino
10 cashout tickets. This payout amount may be added to the customer's total such that the customer is dispensed (via the dispenser 1008a for example) the total amount of currency deposited plus the value of any payout associated with valid cashout tickets.

The funds processing machine 1000 also includes a coin processing module 1048. The coin processing module 1048 sorts, counts and authenticates the mixed coins which
15 are deposited in the coin input receptacle 1044 which leads directly into the coin processing module 1048. The coins are sorted in the coin processing module 1048 in a variety of ways but the preferred method is a sorting based on the diameter of the coins. When a non-authenticated coin is determined by the coin processing module 1048, it is directed through a coin reject tube 1054 towards the dispensed coin receptacle 1046.
20 Thus, the user who has entered such a non-authenticated coin can retrieve the coin by accessing the dispensed coin receptacle 1046. Coin sorting and authenticating devices which can perform the function of the coin processing module 1048 are disclosed in U.S. Patent Nos. 5,299,977, 5,453,047, 5,507,379, 5,542,880, 5,865,673 and 5,997,395, previously incorporated by reference. Alternatively, other coins sorters such as a rail
25 sorter can be used to perform the function of the coin processing module 1048.

The funds processing machine 1000 further includes a document dispensing module 1040 which is connected via transport mechanism 1006 to the dispenser 1008a that is accessible by the user. The document dispensing module 1040 typically dispenses loose bills in response to a request of the user for such bank notes. Also, the document
30 dispensing module 1040 may be configured to dispense strapped notes into the dispenser 1008a if that is desired. In one embodiment of the present invention, the user may select

the denomination of the loose or strapped bills dispensed to the user. As noted above, the document dispensing module 1040 is modified in one embodiment to dispense both currency bills and substitute currency media. For example, in one embodiment, the document dispensing module 1040 may return to the user invalid substitute currency media. In addition, as mentioned above, the document dispensing module 1040 may dispense a barcoded ticket which the customer may redeem for funds.

The funds processing machine 1000 also includes a coin dispensing module 1050 which dispenses loose coins to the user via the dispensed coin receptacle 1046. The coin dispensing module 1050 is connected to the dispensed coin receptacle 1046 via a coin tube 1056. Thus, the user of the funds processing machine 1000 has the ability to select the desired coin denominations that he or she will receive in response to a transaction.

The coins which have been sorted into their denomination by the coin processing module 1048 are sent to coin tubes 1058 which correspond to each specific denomination. The coin tubes 1058 lead to a coin receptacle station 1052 for each of the denominations that are to be sorted and authenticated by the coin processing module 1048.

The funds processing machine 1000 includes a controller 1014 which is coupled to each module 1004, 1040, 1048, 1050 and 1052 within the funds processing machine 1000 and controls the interaction between each module. For example, the controller 1014 may review the input totals from the funds processing modules 1004 and 1048 and direct an appropriate funds output via the funds dispensing modules 1040 and 1050. The controller 1014 also directs the operation of the coin receptacle stations 1052 as described below. While not shown, the controller 1014 may also be coupled to a media reader associated with the media reader slot 1042 and also to a printer at the document dispenser 1020, if these devices are present in the funds processing machine 1000. The printer, for example, may print a barcoded ticket representative of the amount of funds deposited by the customer, or the printer may print a receipt of the transaction.

Document processing device coupled to a computer network

According to another embodiment of the present invention, any of the foregoing systems may be communicatively coupled to a computer network, such as a casino gaming machine network or a retailer network. An example of such an embodiment will be discussed next.

FIG. 11 illustrates a host system 1190 coupled to a plurality of document processing machines 1100a, 1100b, . . . 1100n. The document processing machines 1100a, 1100b, . . . 1100n may be any device shown or described in connection with FIGS. 2-10b. The host system 1190 is further coupled to a computer network 1192. The computer network 1192 provides the host system 1190 with real time information, such as information relating to the demands for particular types of coin receptacles and information about the substitute currency media detected by the document processing machines 1100a-n. In alternate embodiments, the computer network 1192 may be a casino gaming machine network or a retailer network. Each of these embodiments is discussed next.

In one embodiment, the computer network 1192 is a casino gaming machine network and includes a database for storing information about barcoded tickets that have been dispensed by the casino's gaming machines. When a barcoded ticket is dispensed, the ticket number is stored in a database along with the payout amount. A barcode, such as barcode 138 shown in FIG. 1b, encodes the ticket number and the payout amount. When the barcoded ticket is deposited into the document processing machine 1110, the evaluation unit 104 of the document processing machine 1100 reads the barcode on the barcoded ticket. If a valid barcode is read, the document processing machine 1100 transmits the barcode number to the host 1190. The host 1190 queries the computer network 1192 for the payout amount associated with the barcoded number, and transmits the payout amount back to the document processing machine 1100. The document processing machine 1100 adds the payout amount to the running total of currency deposited by the operator into the machine 1100.

Alternatively, the barcode numbers associated with barcoded tickets identified by the document processing machine 1100 are stored in the document processing machine 1100. These numbers are periodically provided to the casino gaming machine network 1192. The casino machine gaming network 1192 may include a casino accounting system. The numbers are matched up with the payout amounts stored in a database associated with the casino machine gaming network 1192, and the payout amounts may then be reconciled in the casino accounting system.

In another embodiment, the casino gaming machine network 1192 is a retailer network that includes a retailer database for storing information about promotional media. For example, a retailer customer may deposit both currency bills and substitute currency media such as store coupons or gift certificates into a self-checkout station at the point of sale. The documents deposited at the self-checkout stations are deposited into a document processing machine 1100. Documents from cash register tills may also be deposited into a document processing machine 1100. The document processing machine 1100 rapidly processes the documents, and identifies the barcode numbers from the barcoded media. These barcode numbers are then transmitted to the retailer network which determines the values associated with the barcode numbers (such as fifty cents off, or a \$50 gift certificate) by querying the retailer database. These values are then reconciled in the retailer's accounting system. Optionally, these values may be transmitted back to the document processing machine 1100 for display to the customer.

Operation of document processing device

Turning now to FIG. 12, there is shown a flowchart describing the operation of a document processing device according to one embodiment of the present invention. Operation begins when an operator deposits documents into an input receptacle of a document processing device (step 1200). Operation may commence automatically, such as when a sensor detects the presence of documents in the input receptacle, or manually, such as when the operator actuates a switch, key, or button on the document processing device. The documents may include a combination of mixed currency bills and substitute currency media, or the documents may include currency bills only or substitute currency media only.

In one embodiment, the input receptacle is adapted to receive a stack of documents. In an alternate embodiment, the input receptacle is adapted to receive one document at a time. The deposited documents are transported, one at a time, along a transport mechanism in the document processing device. In step 1202, a first document is transported past a media detector. In one embodiment, the media detector comprises a barcode reader adapted to scan for barcodes on a document. In step 1204, the media detector provides a signal representative of whether a valid substitute currency medium was detected. For example, if the barcode reader provides a "good read" signal in

response to scanning the first document, the first document is a valid medium. However, if the barcode provides a "no read" signal, the first document is not a valid medium. If the first document is a valid medium, the first document is transported to an output receptacle (step 1206). Which output receptacle receives the first document depends on which
5 output receptacle has been specified according to a preprogrammed or operator-defined mode. If there is only one output receptacle on the document processing device, then the first document is transported to that output receptacle.

Note that between steps 1204 and 1206, in one embodiment, the first document may be first transported to a bill facing mechanism before being transported to an output
10 receptacle. According to one such embodiment, the document processing device is adapted to determine which orientation the first document is facing, and if the first document is facing the wrong orientation, it can be transported to a bill facing mechanism. Alternatively, the desired face orientation can be predetermined either by the manufacturer or the operator. In another embodiment, the first document is not
15 transported to a bill facing mechanism.

If a valid medium is not detected at step 1204, the document is transported past a currency detector at step 1208. If the currency detector detects an authentic currency bill (step 1210), the first document is transported to a pre-selected or operator-defined output receptacle at step 1212. The document processing device can also determine the
20 denomination of the currency bill, and transport the first document to the appropriate output receptacle according to operator-specified instructions or preprogrammed instructions. In one embodiment, a genuine currency bill may optionally be transported to a document facing mechanism, such as the document facing mechanism 203 shown in FIGS. 2 and 3, for proper orientation before being transported to an output receptacle if
25 the currency detector determines that the currency bill is not properly oriented.

In another embodiment, steps 1208 and 1202 are reversed, such that a document is first transported past a currency detector and then past a media detector. In an alternate embodiment, steps 1202 and 1208 (or steps 1208 and 1202) are performed before steps 1204 and 1210 (or steps 1210 and 1204). In other words, in this alternate
30 embodiment, the documents are transported past the media and currency detectors (in any order), and then the document processing device determines whether the document is a

valid medium or authentic currency bill. Note that in an embodiment in which the document processing device has only a single output receptacle, steps 1206 and 1212 are identical because both valid media and authentic currency are transported to the same output receptacle.

5 At step 1214, the document processing device determines whether it is instructed to halt on detecting an unacceptable document, *i.e.*, a document that is neither valid media nor authentic currency, such as a blank piece of paper. These instructions may be operator-specified or preprogrammed. In another embodiment, the document processing device is adapted to determine whether an unacceptable document is an invalid medium or
10 a non-genuine currency bill, and can receive separate instructions on handling each. If the device is instructed to halt on detecting an unacceptable document, the operation of the device is halted or suspended at step 1216 to permit inspection and/or removal of the unacceptable document. At step 1218, operation of the device is restarted once the unacceptable document has been inspected and/or removed from the document processing
15 device, and operation continues at either steps 1200 or 1222 depending on pre-programmed or operator-specified instructions. In one embodiment, the operator may, upon inspection, determine a bill's denomination. In this embodiment, the operator may manually enter the denomination of a currency bill, such as via a denomination key, deposit the bill into an output receptacle, and resume operation. In another embodiment, the
20 operator may, upon inspection, determine information about the unacceptable substitute currency medium, such as the information described above.

 Returning to step 1214, if the document processing device is instructed to offsort unacceptable documents, the unacceptable document is transported to the offsort receptacle at step 1220. The particular offsort receptacle which is to receive unacceptable
25 documents may be operator-specified or preprogrammed. In an embodiment in which the device is adapted to discriminate between invalid media and non-genuine currency bills, the unacceptable document may be routed to one of two offsort receptacles depending on what kind of unacceptable document was detected. This routing decision may be made under the control of operator-specified or preprogrammed instructions.

30 If there are no further documents to be processed at step 1222, the device may optionally display information associated with the processed documents at step 1224.

This information may include any combination of the following according to one or more different embodiments: the total amount of authentic currency bills processed (*e.g.*, \$15,567); a breakdown of the denominations of currency bills processed (*e.g.*, 140 \$1 bills, 147 \$5 bills, 268 \$10 bills, and so on); the total number of valid media detected
5 (*e.g.*, 156 pieces of valid media processed); barcode information detected from barcoded media (*e.g.*, barcode number 12345678); the total number of flagged currency bills processed (*e.g.*, 5 flagged bills, where 3 bills are no call bills, 1 bill is a suspect bill, and 1 bill is both suspect and no call); the total number of invalid media detected (*e.g.*, 16 pieces of invalid media processed); the total amount of media detected (*e.g.*, \$10,000 in media
10 processed); the total number of unidentified documents--*i.e.*, documents which were neither determined to be a currency bill nor a valid substitute currency medium, such as a blank piece of paper for example--detected (*e.g.*, 27 pieces of unidentified documents processed); why a particular currency bill was not authenticated (*e.g.*, 4 bills failed magnetic strip test, 2 bills failed ultraviolet test); the total number of documents processed
15 (*e.g.*, 11,253 documents processed); and other suitable information.

At step 1226, the device may optionally generate a report based on some or all of the information displayed at step 1224. This report may be formatted and displayed to the operator, and/or it may be printed, and/or it may be transmitted to a network computer for storage or further manipulation.

20 Note that in the embodiments described in connection with FIG. 12, the device may further include a coin sorting device in which coins are also processed. The information associated with the processed coins may be combined with the information associated with the processed documents. A single or separate reports may be generated based on the processed coins and processed documents.

25 Turning now to FIG. 13, there is shown a flowchart further describing the operation of a document processing device according to any embodiment described in connection with FIG. 12. At step 1300, documents are deposited into an input receptacle of a document processing device. The documents may include a combination of mixed currency bills and substitute currency media, or they may include currency bills only or
30 substitute currency media only. At steps 1302 and 1304, the device determines whether a first document is a valid barcoded ticket or whether a first document is an authentic

currency bill. Note that steps 1302 and 1304 can be performed in any order. If a document is determined to be a valid barcoded ticket, the barcode number associated with the barcoded ticket is stored in a memory location at step 1306. At step 1308, if a document is determined to be an authentic currency bill, the value of the currency bill is added to the value of all authentic currency bills scanned since step 1300. This value may be initialized to zero or may be initialized to some other number, such as a number representing the total amount of another batch of currency bills which was processed by the document processing device. If the first document is determined to be neither a valid barcoded ticket nor an authentic currency bill, it may be processed at step 1310 in accordance with steps 1214, 1216, 1218, and 1220 described in connection with FIG. 12 hereinabove.

At step 1312, the device determines whether any more documents remain to be processed. If there are, operation continues at step 1302 until there are no further documents to be processed. If no further documents are to be processed, the device retrieves the values associated with the stored barcode numbers from a computer network at step 1314. Alternatively, after each instance in which the device detects a barcode number, the device may retrieve the value associated with the barcode number from the computer network. The computer network may be a casino gaming machine network or a retailer network, for example. In a casino gaming environment, the barcode numbers may be associated with barcoded cashout tickets. In the retailer environment, the barcode numbers may be associated with store coupons, gift certificates, or other barcoded promotional media. In the casino gaming environment, one or more databases may be linked to provide information about the player who redeemed the ticket, when the ticket was dispensed, when the ticket was redeemed, and so forth, based on the barcode number from a cashout ticket. In the retailer environment, one or more databases may be linked to provide information about the product associated with the promotion, manufacturer data, and customer information based on data associated with customer loyalty cards, for example. This information and the other information described in connection with FIG. 12 may be included in a report generated by the device at step 1316. All or a portion of this generated report may be displayed and/or printed and/or stored or transmitted for later retrieval or further manipulation.

Additional details concerning the operation of a document processing device according to the present invention may be found in connection with the description of FIGS. 1a-11 above.

5

Control unit

Referring back to FIG. 1a, there is shown a control unit 116 which may be employed in any embodiment shown or described herein. As previously explained, the control unit 116 may comprise a desktop computer comprising a monitor and keyboard; a touch screen; or a panel including a display and keys, switches, or buttons. In addition, 10 the control unit 116 may comprise a touch/video display, which is described below.

FIG. 14 illustrates a functional block diagram of a touch/video display 1400 according to one embodiment of the present invention. The touch/video display 1400 is a display that comprises a touch portion 1402 and a video portion 1404. The touch portion 1402 of the display 1400 operates as a touch screen, accepting input from the operator 15 through actuation of specific areas 1406, 1408 on the touch portion 1402. The touch portion 1402 may also display information to the operator. The video portion 1404 of the display operates as a video display. For example, an operator of a document processing device in accordance with any embodiment shown or described herein may need assistance in operating the device. In a training mode, for example, the touch/video 20 display 1400 would receive input from the operator indicating a desired area of training (such as clearing document jams, for example) via the touch portion 1402 of the touch/video display 1400, and would display a video presentation, for example, of the desired area of training on the video portion 1404. The video presentation could direct the operator to perform various tasks as part of the training mode, pausing to permit the 25 operator to complete a task, and then resuming when the operator so indicates by touching a specific area on the touch portion 1402 of the touch/video display 1400, such as specific area 1406. In alternate embodiments, the touch/video display 1400 may be employed to provide interactive help or instructional presentations regarding various operations of the document processing device, or to communicate messages such as 30 advertisements or other information to an operator.

As described above, an operator may select via the control unit 116 any one of a multitude of preprogrammed or user-defined modes, such as disclosed in U.S. Patent No. 6,278,795, entitled "Multi-Pocket Currency Discriminator, previously incorporated by reference. The operator may select these and other modes via an interface such as the
5 control unit 116 shown in FIG. 1a and described above.

While the invention is susceptible to various modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and herein described in detail. It should be understood, however, that it is not intended to limit the invention to the particular forms disclosed, but on the contrary, the intention is to
10 cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

CLAIMS:

1. A funds processing system including at least one funds processing machine in which a user inputs currency bills and substitute funds, the at least one funds processing machine comprising:
 - 5 an input receptacle adapted to receive a stack of currency bills and substitute funds;
 - a processing module coupled to the input receptacle and adapted to process the currency bills and substitute funds; and
 - a return receptacle coupled to the processing module and adapted to return the
- 10 substitute funds to the operator of the funds processing machine.
2. The system of claim 1, wherein the substitute funds are casino script.
3. The system of claim 1, wherein the substitute funds are paper tokens.
4. The system of claim 1, wherein the substitute funds are bar coded tickets.
5. The system of claim 1, wherein the processing module is adapted to scan and
- 15 count the currency bills and substitute funds at a high rate of speed.
6. The system of claim 5, wherein the high rate of speed is at least 350 documents per minute.
7. The system of claim 1 further comprising:
 - a host system communicatively coupled to the at least one funds processing
- 20 machine; and
- a casino gaming network communicatively coupled to the at least one funds processing machine and to the host system.
8. A method of processing currency bills and substitute funds using a funds processing machine, the method comprising the steps of:
 - 25 receiving in an input receptacle a stack of currency bills and substitute funds, wherein the substitute funds includes one of casino script, paper tokens, and bar coded tickets;
 - scanning the currency bills and substitute funds in a processing module; and
 - transporting the substitute funds from the input receptacle to a return receptacle.
- 30 9. The method of claim 8, wherein the step of scanning is performed at a high rate of speed.

10. The method of claim 8 further comprising the step of communicatively coupling the funds processing machine to a casino gaming network.

11. A system for processing both currency bills and substitute currency media, the system including a document processing apparatus, the apparatus comprising:

- 5 an input receptacle adapted to receive currency bills and substitute currency media;
- at least one output receptacle adapted to receive currency bills and substitute currency media after the currency bills and substitute currency media have been evaluated;
- 10 a transport mechanism adapted to transport the currency bills and substitute currency media, one at a time, from the input receptacle to the at least one output receptacle along a transport path;
- an evaluation unit comprising at least one currency detector disposed along the transport path between the input receptacle and the output receptacle, the
- 15 at least one currency detector being capable of evaluating currency bills, and a first media detector disposed along the transport path between the input receptacle and the output receptacle, the first media detector being capable of evaluating substitute currency media; and
- a controller coupled to the evaluation unit, the controller being adapted to control
- 20 the operation of the transport mechanism and the operation of the evaluation unit.

12. The apparatus of claim 11 further comprising a communications port electrically coupled to the controller.

13. The system of claim 12 further comprising a coin sorting apparatus

25 communicatively coupled to the communications port of the document processing apparatus, said coin sorting apparatus sorting and counting a plurality of coins into one or more coin hoppers, said coin sorting apparatus including communications means for communicating information associated with said counting of said plurality of coins.

14. The apparatus of claim 11 wherein the controller causes the transport mechanism

30 to halt in response to the detection of a particular currency bill or substitute currency medium that meets or fails to meet one or more criteria, wherein the halting causes the

particular currency bill or substitute currency medium to be located at a predetermined position.

15. The apparatus of claim 11 wherein the controller flags a currency bill or substitute currency medium meeting or failing to meet one or more criteria, the currency bill or substitute currency medium meeting or failing to meet one or more criteria being termed a
5 flagged document, the apparatus further comprising a routing interface comprising a data retrieval device, the data retrieval device receiving information from a user of the apparatus specifying a set of one or more output receptacles to which flagged documents are to be directed.

10 16. The apparatus of claim 15 further comprising a control unit coupled to the controller, the control unit including denomination keys, each of the denomination keys being associated with a different amount of currency, the selection of one of the denomination keys causing the associated amount of currency to be added to a running total amount of currency processed by the device.

15 17. The apparatus of claim 11 further comprising a control unit coupled to the controller, the control unit being adapted to receive information from a user of the apparatus and to display information to a user of the apparatus.

18. The apparatus of claim 17, wherein the information includes characteristic information associated with a substitute currency medium.

20 19. The apparatus of claim 18, wherein the characteristic information includes the value associated with a substitute currency medium.

20. The apparatus of claim 18, wherein the substitute currency media are barcoded tickets having a barcode disposed thereon, each barcoded ticket having a ticket number, the characteristic information including the ticket number of the barcoded ticket.

25 21. The apparatus of claim 17 wherein the control unit includes a touch screen.

22. The apparatus of claim 17 wherein the control unit includes a video display.

23. The apparatus of claim 11 wherein the evaluation unit evaluates the currency bills and substitute currency media at a rate of at least about 1000 documents per minute.

24. The apparatus of claim 11 wherein the evaluation unit evaluates the currency bills
30 and substitute currency media at a rate of at least about 1500 documents per minute.

25. The apparatus of claim 11 further comprising a document facing mechanism coupled to said evaluation unit, said document facing mechanism being adapted to rotate the orientation of the substitute currency media in one direction.

26. The apparatus of claim 11 further comprising a second media detector disposed
5 along the transport path and proximate the at least one currency detector, wherein the first media detector is adapted to detect at least one characteristic of a first type of substitute currency media and the second media detector is adapted to detect at least one characteristic of a second type of substitute currency media, the first type of substitute currency media being different from the second type of substitute currency media.

10 27. The apparatus of claim 26, wherein the first type of substitute currency media includes a barcode encoded according to a first barcode symbology.

28. The apparatus of claim 26, wherein the second type of substitute currency media includes a barcode encoded according to a second barcode symbology.

29. The apparatus of claim 11 further comprising a second media detector capable of
15 evaluating substitute currency media, the first media detector and the second media detector being disposed on opposite sides of the transport path so as to be disposed adjacent to first and second opposing surfaces of the currency bills or substitute currency media passing along the transport path.

30. The apparatus of claim 11 wherein the at least one output receptacle is exactly one
20 output receptacle.

31. The apparatus of claim 11 wherein the at least one output receptacle is exactly two output receptacles.

32. The apparatus of claim 11 wherein the at least one output receptacle is at least eight output receptacles.

25 33. The apparatus of claim 11, wherein the media detector includes a barcode reader.

34. The apparatus of claim 33 further comprising memory means for storing information associated with at least one barcode identified by the barcode reader.

35. The apparatus of claim 33 further comprising a mirror proximate the barcode reader, the mirror being positioned to deflect a light beam outputted from the barcode
30 reader onto the surface of a document being transported along the transport path.

36. The apparatus of claim 33, wherein the substitute currency media have a barcode pattern disposed on at least one surface thereof, and wherein the controller is adapted to convert an electrical signal generated by the barcode reader into a set of characters, the electrical signal being generated in response to the scanning of a valid barcode pattern.
- 5 37. The apparatus of claim 36 further comprising:
a memory coupled to the controller, the memory being adapted to store at least a first set of characters provided by the controller; and
a communications port coupled to the controller, the communications port being adapted to transmit the at least first set of characters.
- 10 38. The apparatus of claim 11 wherein the currency detector is adapted to detect at least one characteristic of a currency bill.
39. The apparatus of claim 38, wherein the at least one characteristic is one of size, thickness, color, magnetism, reflectivity, absorbability, transmissivity, electrical conductivity, and serial number.
- 15 40. The apparatus of claim 38, wherein the at least one detection means is an optical scan head.
41. The apparatus of claim 38, wherein the at least one detection means is a magnetic sensor.
42. The apparatus of claim 38, wherein the at least one detection means is a size
20 detection sensor.
43. The apparatus of claim 38, wherein the at least one detection means is a density sensor.
44. The apparatus of claim 38, wherein the at least one detection means is a thread sensor.
- 25 45. The apparatus of claim 38, wherein the at least one detection means is an infrared sensor.
46. The apparatus of claim 38, wherein the at least one detection means is an ultraviolet scan head.
47. The apparatus of claim 38, wherein the at least one detection means is a
30 fluorescent light scan head.

48. The apparatus of claim 38, wherein the at least one detection means is a full image scanner.
49. The apparatus of claim 11, wherein the substitute currency media are barcoded media having a barcode on at least one surface thereof.
- 5 50. The apparatus of claim 49, wherein the barcode is a linear barcode.
51. The apparatus of claim 49, wherein the barcoded media are casino script.
52. The apparatus of claim 49, wherein the barcoded media are casino cashout tickets.
53. The apparatus of claim 49, wherein the barcoded media are retailer coupons.
54. The apparatus of claim 49, wherein the barcoded media are gift certificates.
- 10 55. The apparatus of claim 49, wherein the barcoded media have substantially the same dimensions as U.S. currency bills.
56. A system adapted to rapidly count and evaluate currency bills and barcoded media, the barcoded media having a barcode disposed on at least one surface thereof, the system comprising:
- 15 an input receptacle adapted to receive a stack of documents, the documents including currency bills and barcoded media;
- at least one output receptacle adapted to receive at least a portion of the stack of documents after the documents have been evaluated;
- a transport mechanism adapted to transport the documents, one at a time, from
- 20 the input receptacle to the at least one output receptacle along a transport path;
- an evaluation unit including a first sensor disposed along the transport path between the input receptacle and the output receptacle, the first sensor being adapted to detect at least one characteristic of a currency bill, and a
- 25 first barcode reader disposed along the transport path between the input receptacle and the output receptacle, the barcode reader being adapted to scan a barcode; and
- a controller coupled to the evaluation unit, the controller being adapted to control the operation of the transport mechanism and the operation of the
- 30 evaluation unit.

57. The system of claim 56, wherein the first barcode reader is adapted to scan at least 500 barcodes per minute.
58. The system of claim 56, wherein the first barcode reader is adapted to scan at least 1000 barcodes per minute.
- 5 59. The system of claim 56, wherein the first barcode reader is adapted to output an electrical signal representing a barcode symbol, the controller being adapted to convert the electrical signal into a barcode number.
60. The system of claim 59 further comprising memory coupled to the controller, the memory being adapted to store the barcode number.
- 10 61. The system of claim 59 further comprising a communications port coupled to the controller, the communications port being adapted to communicatively link the controller to a computer network.
62. The system of claim 61, wherein the computer network is a casino gaming machine network.
- 15 63. The system of claim 61, wherein the computer network is a retailer network.
64. The system of claim 62, wherein the controller is adapted to retrieve a monetary amount associated with the barcode number from the casino gaming machine network.
65. The system of claim 56 further comprising a control unit coupled to the controller, the control unit being adapted to display the number of barcoded media processed by the
- 20 apparatus.
66. The system of claim 65, wherein the control unit is a touch panel display.
67. The system of claim 65, wherein said control unit is a touch/video display.
68. The system of claim 59 further comprising a control unit coupled to the controller, the control unit being adapted to display the barcode number.
- 25 69. The system of claim 64, wherein the controller is adapted to add the monetary amount associated with the barcode number to a running total.
70. The system of claim 69, wherein the running total includes the monetary value of at least one currency bill evaluated by the evaluation unit.
71. The system of claim 56 further comprising a second barcode reader coupled to the
- 30 controller, the first barcode reader and the second barcode reader being disposed on opposite sides of the transport path.

72. The system of claim 56 further comprising a printer coupled to the controller, the controller being adapted to generate a report, the report including the total amount of authentic currency bills processed from the stack of documents and the total number of substitute currency media processed from the stack of documents, the printer being adapted to print at least a portion of the report.

73. The system of claim 56 further comprising a printer coupled to the controller, the printer being adapted to dispense a barcoded ticket to a user of the device.

74. The system of claim 73, wherein the barcoded ticket includes a barcode associated with the total amount of currency bills and substitute currency media processed by the device.

75. The system of claim 56 wherein the at least one output receptacle is exactly one output receptacle.

76. The system of claim 56 wherein the at least one output receptacle is exactly two output receptacles.

77. The system of claim 56 wherein the at least one output receptacle is at least eight output receptacles.

78. The system of claim 56, wherein the barcode reader has a height of about 3 inches, a width of about 2.13 inches, and a depth of about 1.63 inches.

79. A document processing apparatus for processing a stack of currency bills and barcoded media, comprising:

- an input receptacle adapted to receive a stack of documents including currency bills of mixed denominations and barcoded media;

- a plurality of output receptacles each adapted to receive at least a portion of the stack of documents;

- a transport mechanism adapted to transport the currency bills and barcoded media, one at a time, from the input receptacle to one of the plurality of output receptacles;

- an evaluation unit disposed along the transport path between the input receptacle and the plurality of output receptacles, the evaluation unit comprising at least one currency sensor and a barcode reader positioned adjacent the transport path, the at least one currency sensor being adapted to obtain

denomination characteristic information of a first currency bill, the barcode reader being adapted to scan for a barcode on a document from the stack of documents passing along the transport path, a document on which the barcode reader detects a barcode being termed a valid barcoded medium, a document on which the barcode reader does not detect a barcode being termed an invalid barcoded medium;

a controller coupled to the evaluation unit, the controller being programmable for directing currency bills having a first denomination to a specified first output receptacle of the plurality of output receptacles, and for directing a barcoded media having a valid barcode disposed thereon to a specified second output receptacle of the plurality of output receptacles; and

a memory electrically coupled to the controller, the memory being adapted to store the denominations of the currency bills and the characters associated with barcodes on barcoded media.

80. The apparatus of claim 79, wherein the at least one currency sensor is further adapted to obtain authenticating characteristic information of a currency bill, the controller being adapted to compare the authenticating characteristic information with master authenticating information stored in a memory, the controller being further adapted to compare the denomination characteristic information with master denomination information stored in a memory, wherein currency bills whose authenticating characteristic information satisfies a predetermined relationship with the master authenticating information are termed authentic bills, currency bills whose authenticating characteristic information does not satisfy a predetermined relationship with the master authenticating information are termed suspect bills, and currency bills whose denomination characteristic information does not satisfy a predetermined relationship with the master denomination characteristic information are termed no call bills.

81. The apparatus of claim 80, wherein the controller is adapted to direct no call bills to a specified third output receptacle of the plurality of output receptacles.

82. The apparatus of claim 80, wherein the controller is adapted to direct suspect bills to a specified third output receptacle of the plurality of output receptacles.

83. The apparatus of claim 80, wherein the controller is adapted to direct no call bills to a specified third output receptacle of the plurality of output receptacles and to direct suspect bills to a specified fourth output receptacle of the plurality of output receptacles.

84. The apparatus of claim 80, wherein the controller is adapted to direct no call bills
5 and suspect bills to a specified third output receptacle.

85. The apparatus of claim 80, wherein the controller is adapted to direct invalid barcoded media to a specified third output receptacle.

86. The apparatus of claim 80, wherein the controller is adapted to direct invalid barcoded media to the specified second output receptacle.

10 87. A document processing apparatus adapted to process currency bills and substitute currency media, the apparatus:

an input receptacle adapted to receive documents including currency bills and
substitute currency media, the substitute currency media being redeemable
documents;

15 at least one output receptacle adapted to receive at least a portion of the documents after the portion of the documents have been evaluated;

a transport mechanism adapted to transport the documents, one at a time, from
the input receptacle to the at least one output receptacle along a transport
path;

20 an evaluation unit comprising at least one scanner disposed along the transport path between the input receptacle and the output receptacle, the at least a first scanner being capable of scanning for at least one characteristic associated with a currency bill, the evaluation unit further comprising a second scanner capable of scanning for at least one characteristic
25 associated with a substitute currency medium; and

a controller coupled to the evaluation unit, the controller being adapted to control
the operation of the transport mechanism and the operation of the
evaluation unit.

88. A document processing apparatus for processing both currency bills and substitute
30 currency media, the apparatus comprising:

an input receptacle for receiving currency bills and substitute currency media;

- a plurality of output receptacles for receiving currency bills and substitute currency media after the currency bills and substitute currency media have been evaluated;
- 5 a transport mechanism for transporting the currency bills and substitute currency media, one at a time, from the input receptacle to one of the plurality of output receptacles along a transport path;
- an evaluation unit comprising a scanhead disposed along the transport path between the input receptacle and the output receptacle, the scanhead comprising a sensor for evaluating the currency bills and a barcode reader
- 10 for evaluating the substitute currency media;
- a controller coupled to the evaluation unit, the controller controlling the operation of the transport mechanism and the operation of the evaluation unit; and
- an interface coupled to the controller, the interface being adapted to receive instructions from an operator of the apparatus specifying one or more of
- 15 the plurality of output receptacles to which currency bills and substitute currency media are to be directed.
89. A document processing apparatus for processing both currency bills and redeemable documents, the apparatus comprising:
- an input receptacle for receiving currency bills and redeemable documents;
- 20 a plurality of output receptacles for receiving currency bills and redeemable documents after the currency bills and the redeemable documents have been evaluated;
- a transport mechanism for transporting the currency bills and redeemable documents, one at a time, from the input receptacle to selected ones of the
- 25 plurality of output receptacles along a transport path;
- an evaluation unit comprising a detector disposed along the transport path between the input receptacle and the output receptacle, the detector being adapted to detect characteristic information associated with a currency bill and characteristic information associated with a redeemable document; and
- 30 a controller coupled to the evaluation unit, the controller controlling the operation of the transport mechanism and the operation of the evaluation unit.

90. A method of processing both currency bills and substitute currency media in a document processing device, the method comprising the steps of:

receiving a stack of documents including currency bills and substitute currency media to be evaluated in an input receptacle of the device;

5 transporting each of the documents, one document at a time, past a currency detector and past a media detector;

scanning each document to obtain characteristic information associated with a currency bill;

10 scanning each document to obtain characteristic information associated with a substitute currency medium;

determining whether each document meets or fails at least one criterion; and

directing each document to at least one output receptacle based on the step of determining.

91. The method of claim 90 further comprising the steps of:

15 receiving information from a user of the device specifying whether the device should suspend operation based upon the detection of a substitute currency medium failing to meet the at least one criterion; and

20 suspending operation of the device in response to receiving information from the user of the device specifying that the device should suspend operation based upon the detection of a substitute currency medium failing to meet the at least one criterion.

92. The method of claim 90 wherein the device includes a plurality of output receptacles and wherein the characteristic information associated with a currency bill includes denomination characteristic information, the method further comprising the steps
25 of:

comparing the denomination characteristic information of the currency bill with a master denomination information;

30 flagging the currency bill as a flagged bill when the denomination characteristic information of the currency bill fails to meet one or more criteria associated with the master denomination information; and

receiving routing information from a user specifying to which of the plurality of output receptacles the flagged bill is to be directed, the step of receiving permitting the user to direct the flagged bill to a selected one of the plurality of output receptacles.

93. The method of claim 92 further comprising the steps of:

- 5 adding the value of the currency bills of one or more denominations whose denomination characteristic information meets one or more criteria associated with the master denomination information to a running total; and
 displaying the running total to the user of the device.

94. The method of claim 93 further comprising the steps of:

- 10 receiving denomination information from the user specifying the denomination of a flagged bill;
 adding the denomination of the flagged bill to the running total; and
 resuming operation of the device.

95. The method of claim 90 wherein the device includes a plurality of output
15 receptacles and wherein the characteristic associated with the currency bills includes the authenticity of the currency bills, the method further comprising the step of receiving information from a user of the device specifying to which of the plurality of output receptacles currency bills whose authenticity have been determined and currency bills whose authenticity have not been determined are to be directed, the step of receiving
20 permitting the user to direct currency bills whose authenticity have not been determined to selected one or more of the plurality of output receptacles.

96. The method of claim 90, wherein the characteristic information associated with the substitute currency media includes barcode information, wherein the step of scanning each document to obtain characteristic information associated with a substitute currency
25 medium is carried out using a barcode reader, the method further comprising the steps of:

- decoding from a valid barcode a barcode number representative of the valid
 barcode; and
 storing the barcode number in a memory.

97. The method of claim 90 further comprising the steps of:

- 30 counting the total number of substitute currency media processed by the device;
 and

displaying the total number to the user of the device.

98. The method of claim 97, wherein the displaying step is carried out using a touch screen panel.

99. The method of claim 96 further comprising the step of displaying to a user of the
5 device the barcode number.

100. The method of claim 96 further comprising the step of retrieving from a network computer a value associated with the barcode number.

101. The method of claim 100, wherein the value is an amount of currency redeemable for cash.

102. The method of claim 100, wherein the value is an amount of currency redeemable
10 for goods or services.

103. The method of claim 100, wherein the value is a promotional discount.

104. A method of rapidly counting and evaluating currency bills and barcoded media in a document processing device, the method comprising the steps of:

15 receiving a stack of currency bills of mixed denominations and barcoded media to be evaluated in an input receptacle of the device, the barcoded media being redeemable documents having a barcode disposed thereon;

transporting the currency bills and the barcoded media, one document at a time, from the input receptacle to one of a plurality of output receptacles;

20 determining the denomination of the currency bills;

decoding the barcode numbers from valid barcodes disposed on the barcoded media;

storing the barcode numbers and the denominations of the currency bills;

receiving information from a user of the device specifying to which of the plurality

25 of output receptacles currency bills of one or more denominations and barcoded media having decodable barcodes are to be directed; and

directing the barcoded media having invalid barcodes to the offsort receptacle.

105. A method of processing currency bills and barcoded media in a document processing device, the method comprising the steps of:

30 receiving a stack of currency bills of mixed denominations and barcoded media to be evaluated in an input receptacle of the device;

- transporting the currency bills and barcoded media, one document at a time, from the input receptacle to one of a plurality of output receptacles or to an offsort receptacle;
- evaluating the currency bills including authenticating and denominating the currency bills;
- maintaining a total of the value of currency bills processed;
- maintaining a total of the number of currency bills processed;
- evaluating the barcoded media including scanning for a valid barcode disposed on the barcoded media;
- storing the barcode numbers associated with the barcoded media having valid barcodes;
- maintaining a total of the number of substitute media processed; and
- displaying to a user of the device information associated with the currency bills and information associated with the substitute currency media.
106. The method of claim 105, wherein the information associated with the currency bills includes the total of the value of currency bills processed.
107. The method of claim 105, wherein the information associated with the currency bills includes the number of currency bills processed.
108. The method of claim 105, wherein the information associated with the substitute currency media includes the number of substitute currency media processed.
109. The method of claim 105, wherein the information associated with the substitute currency media includes the value of substitute media processed.
110. The method of claim 105 further comprising the steps of:
- retrieving from a network computer the values associated with the barcode numbers;
- maintaining a total of the value of barcoded media processed; and
- displaying to the user of the device the total of the value of barcoded media processed.
111. A method of processing currency bills and redeemable documents in a single document processing device, the method comprising the steps of:
- receiving a stack of currency bills;

detecting currency characteristic information associated with each currency bill;
receiving a stack of redeemable documents;
detecting media characteristic information associated with each redeemable
document; and
5 storing the media characteristic information in a memory.

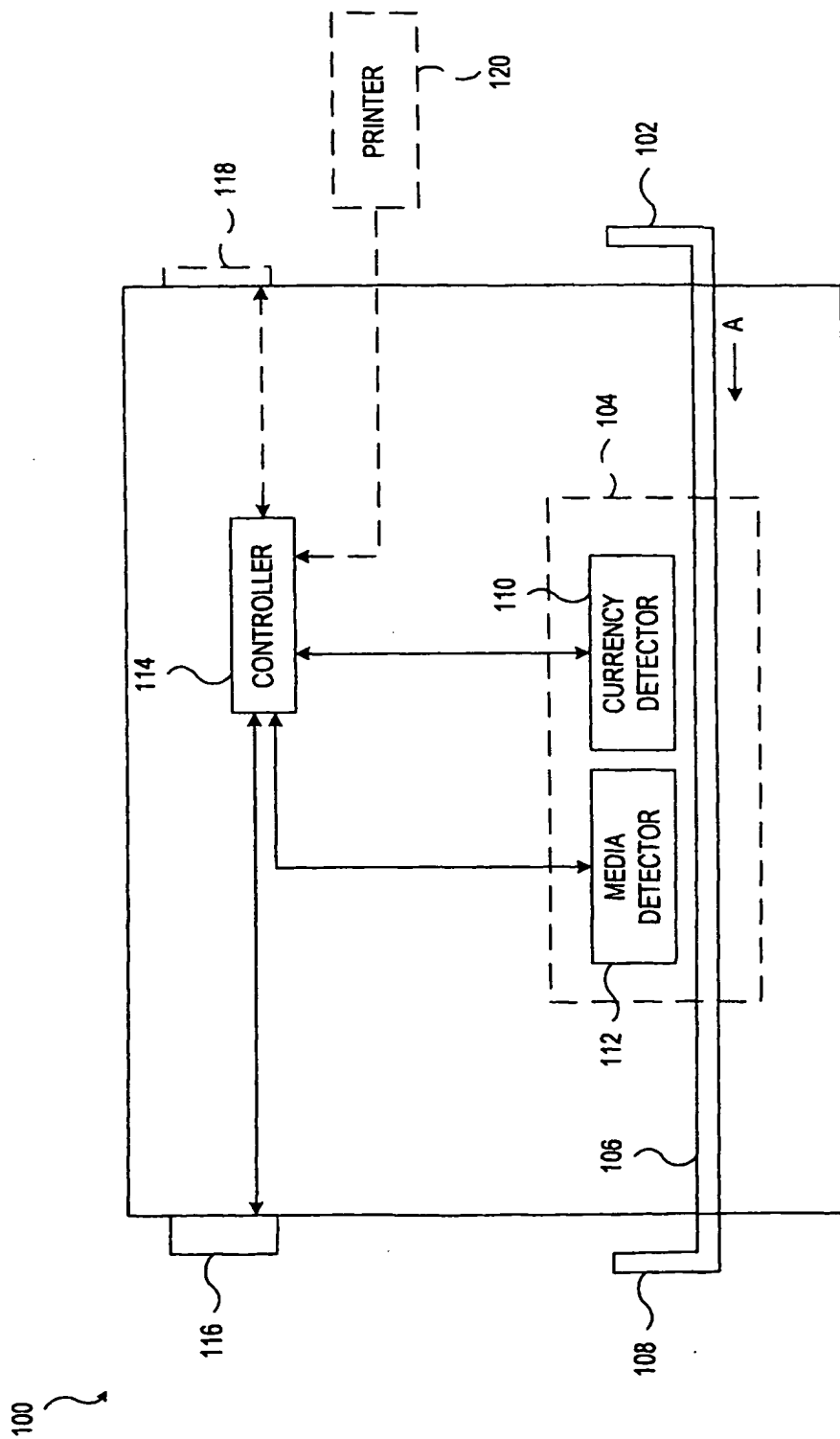


FIG. 1a

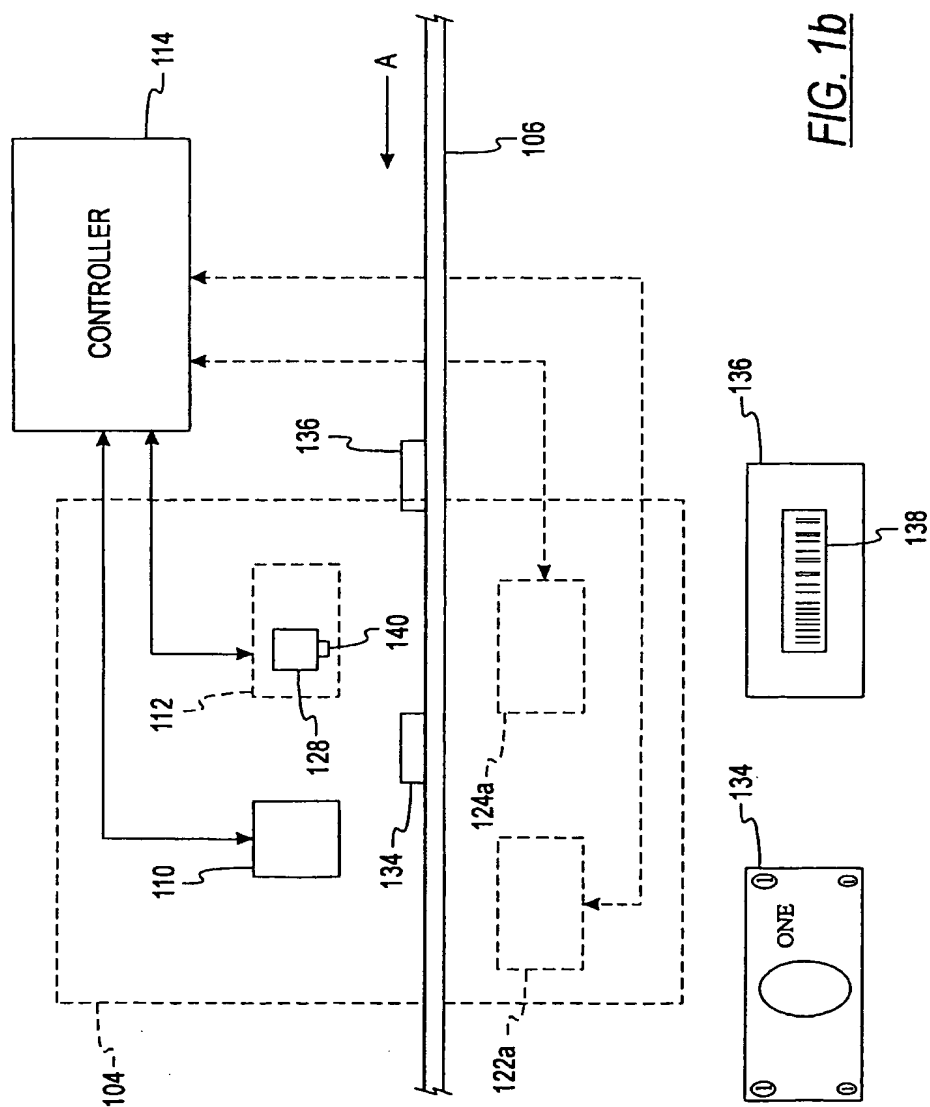
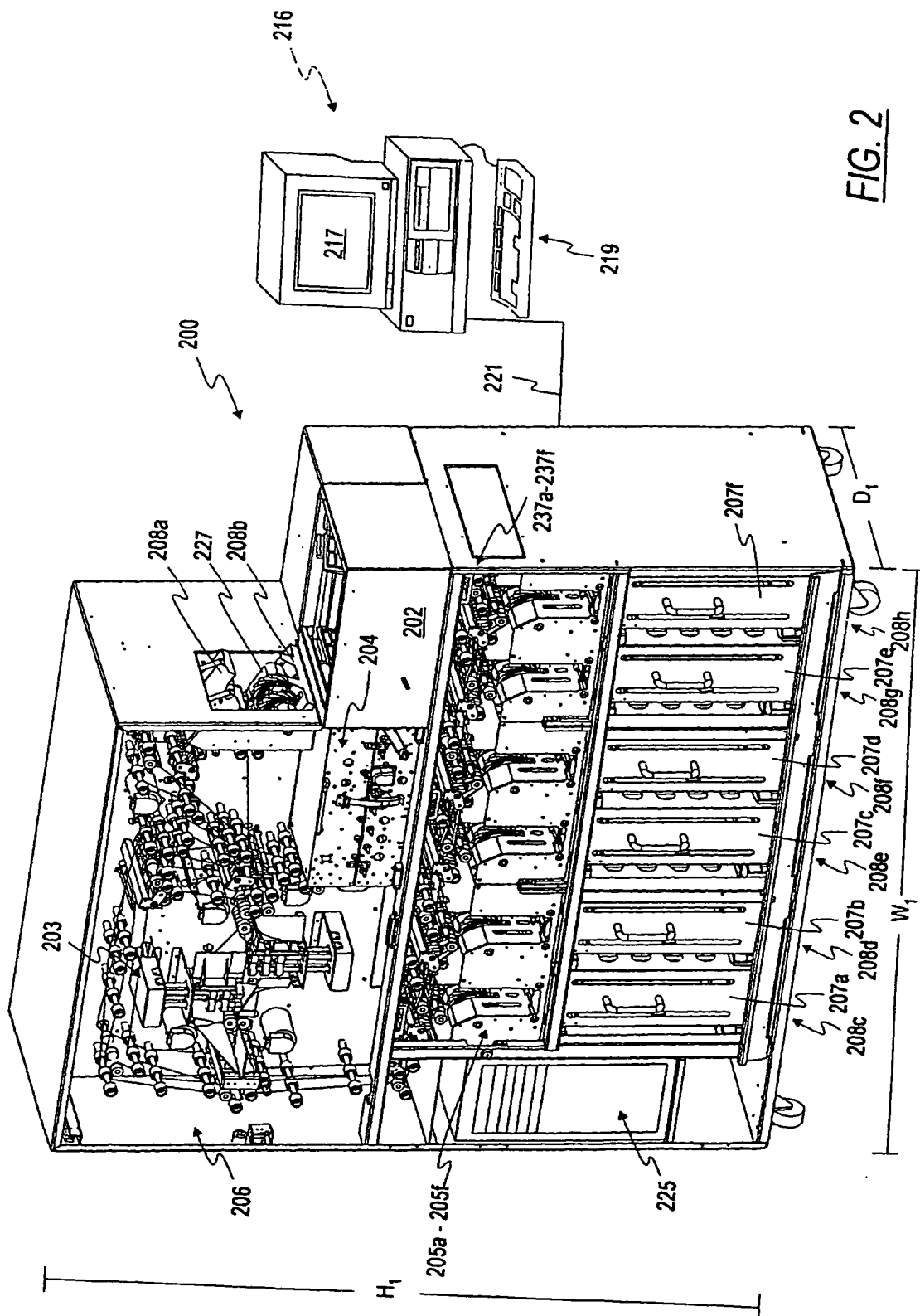


FIG. 1b



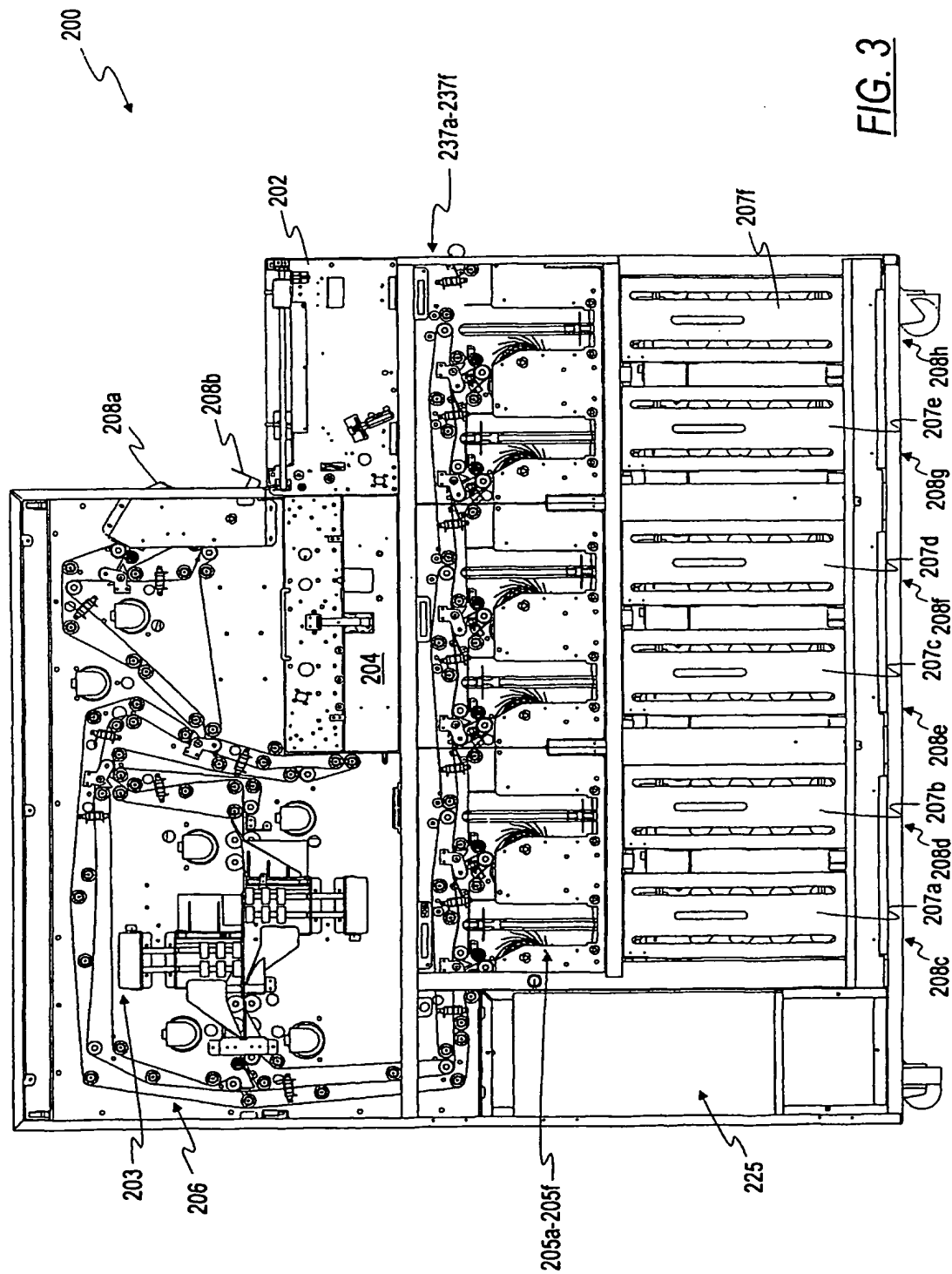
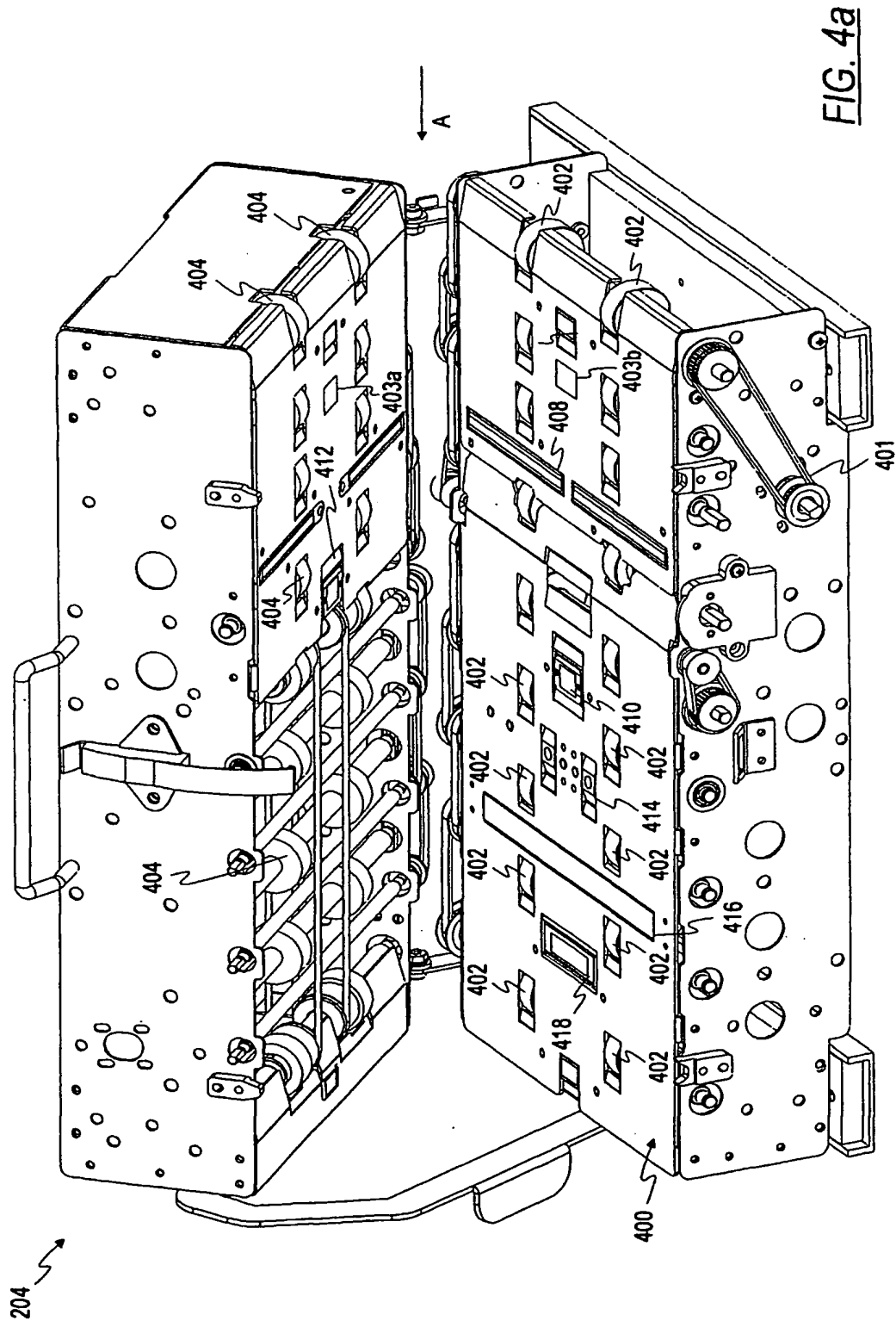


FIG. 3



204

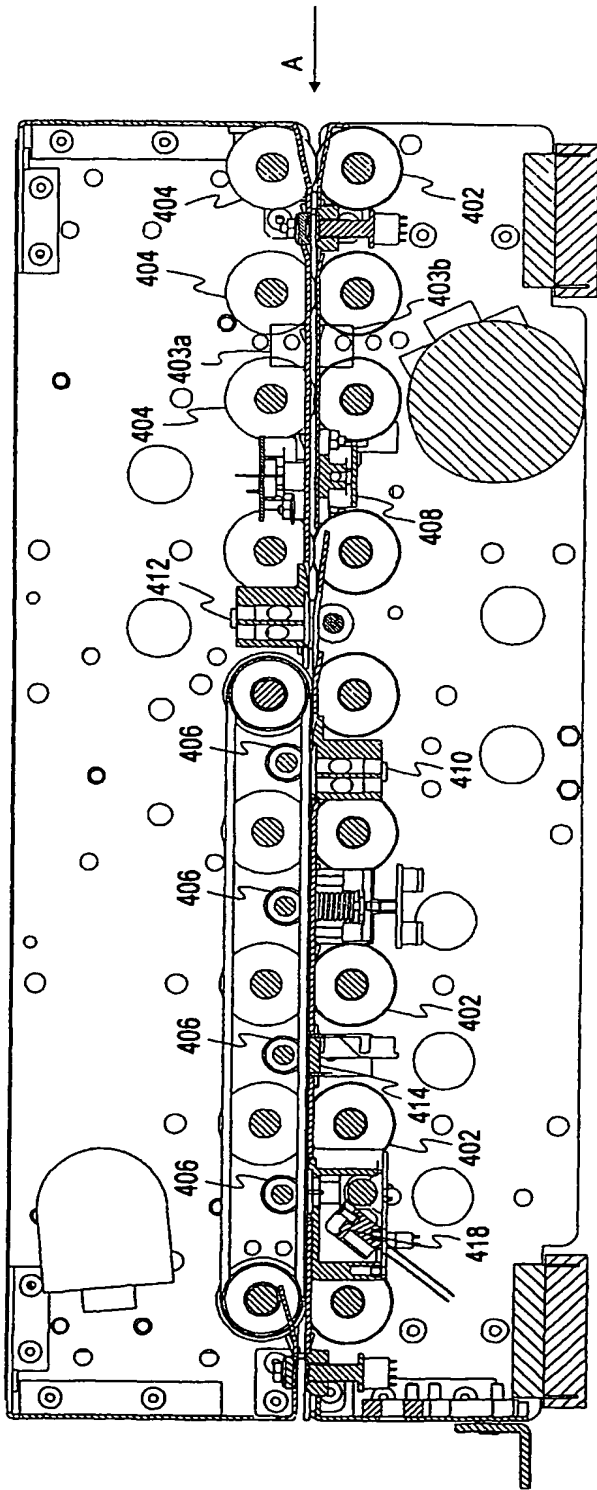


FIG. 4b

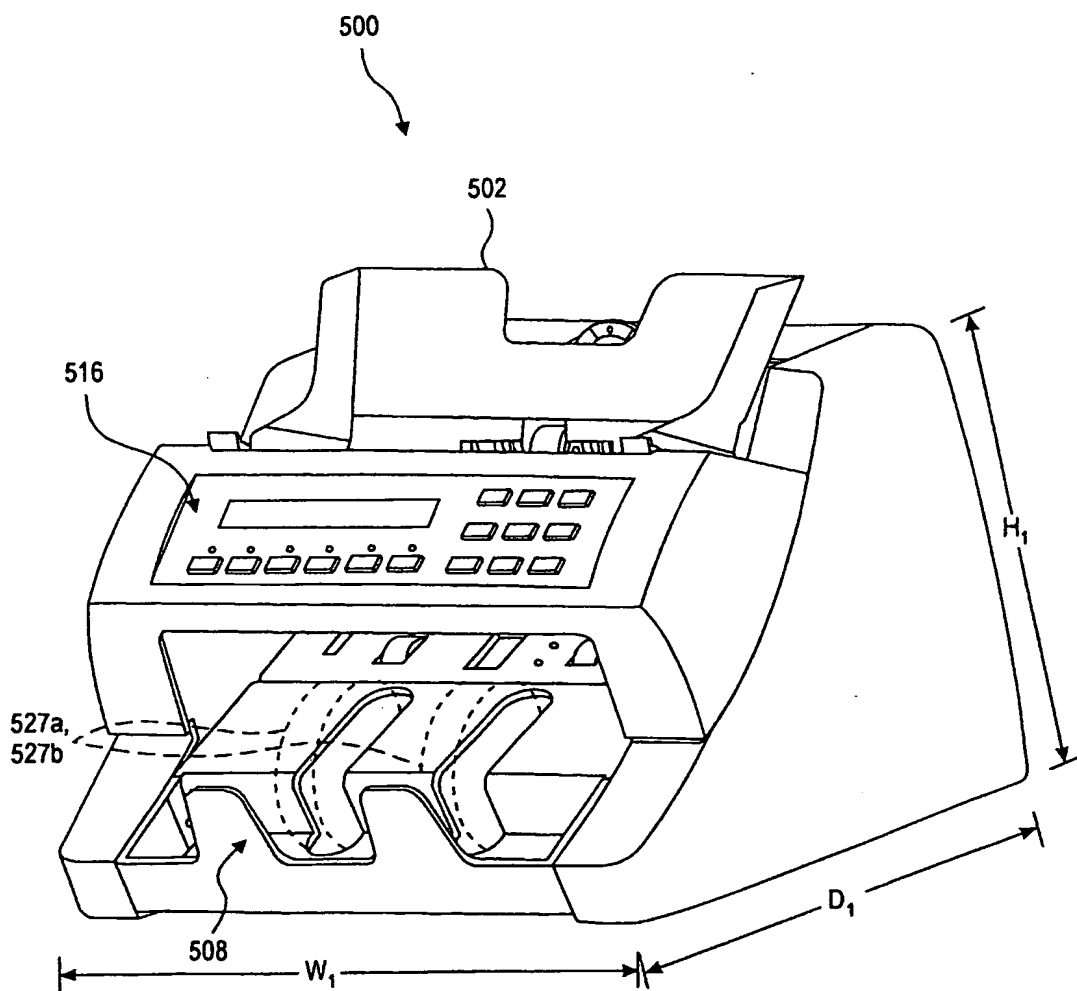


FIG. 5

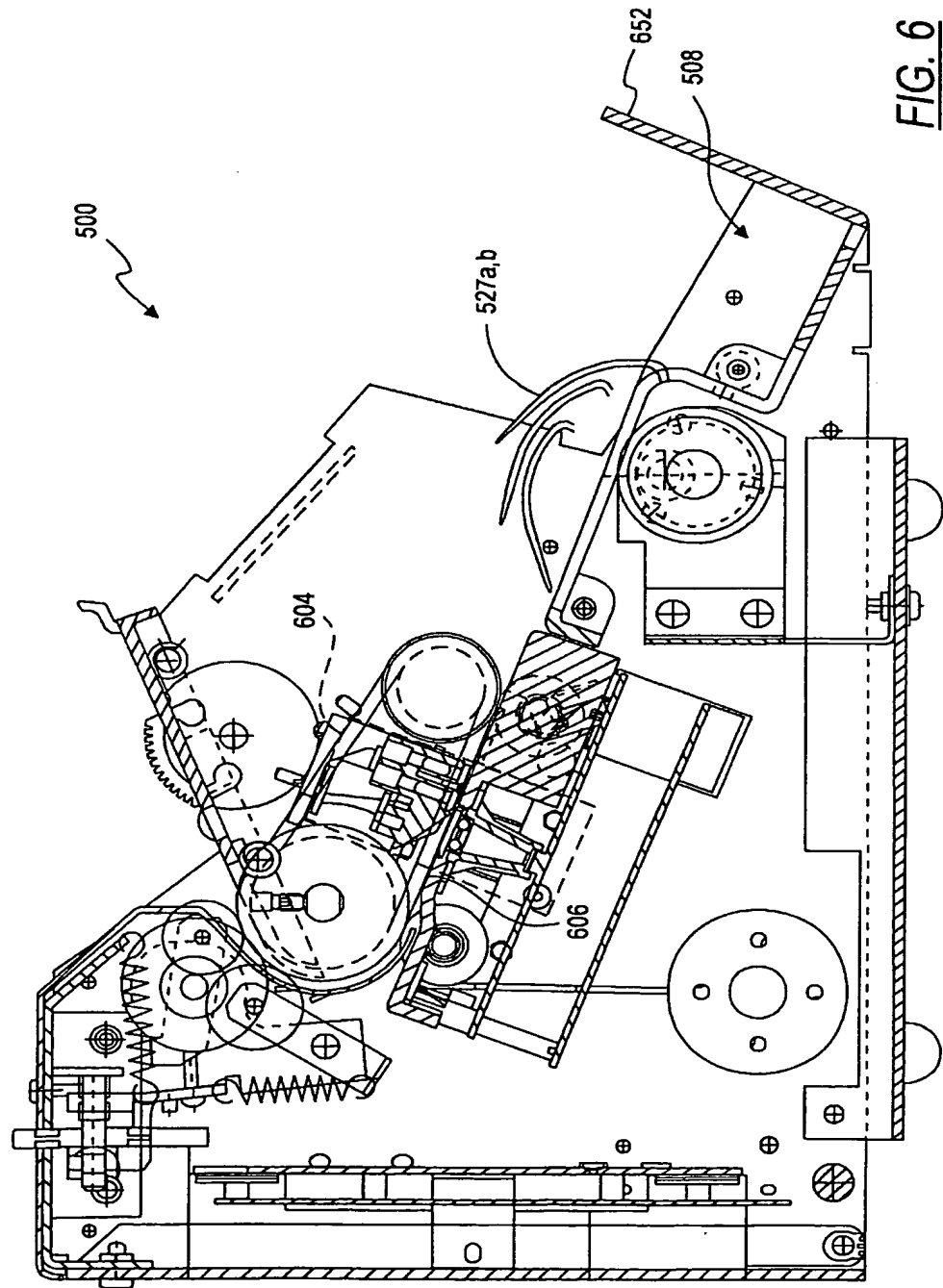


FIG. 6

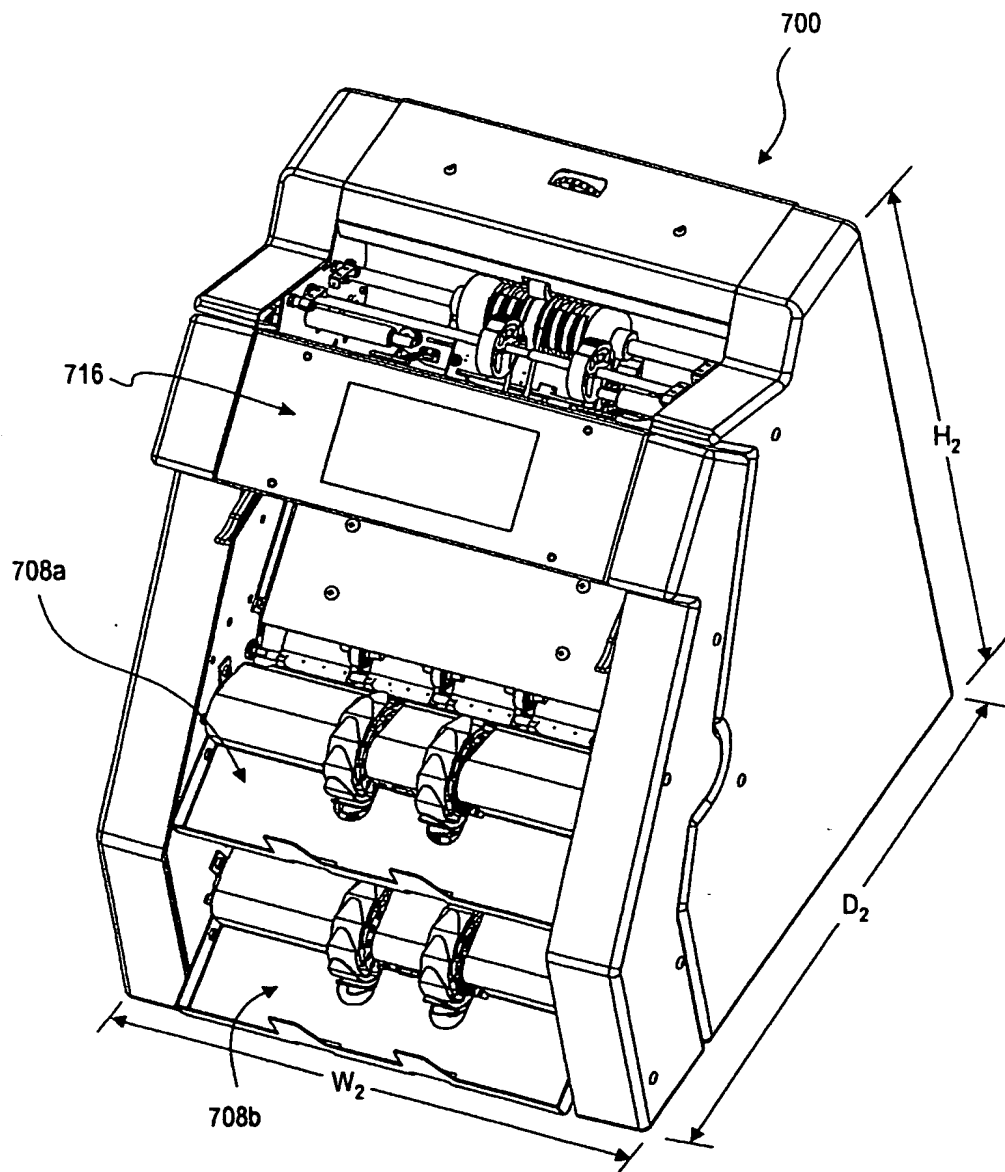


FIG. 7a

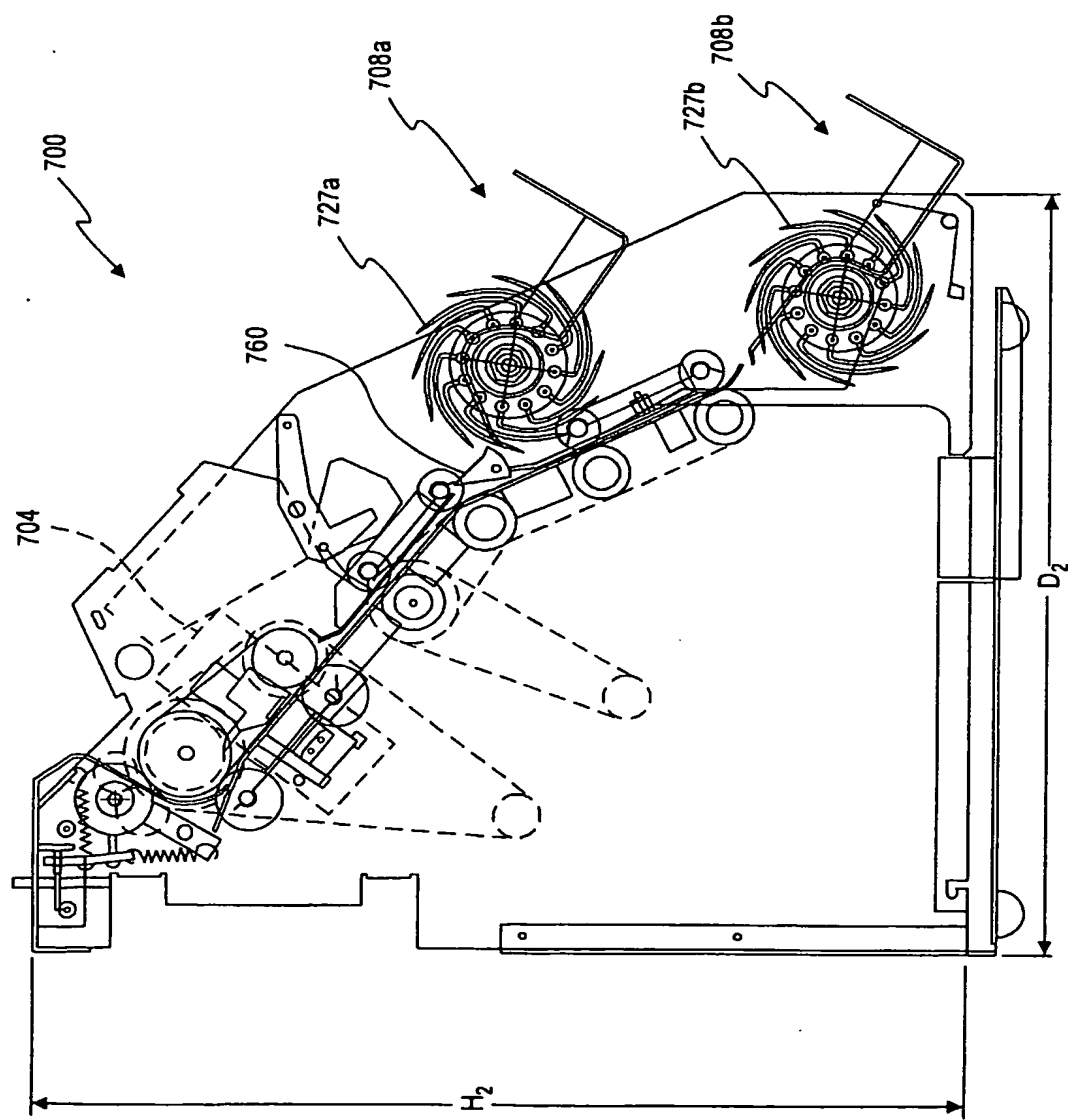


FIG. 7b

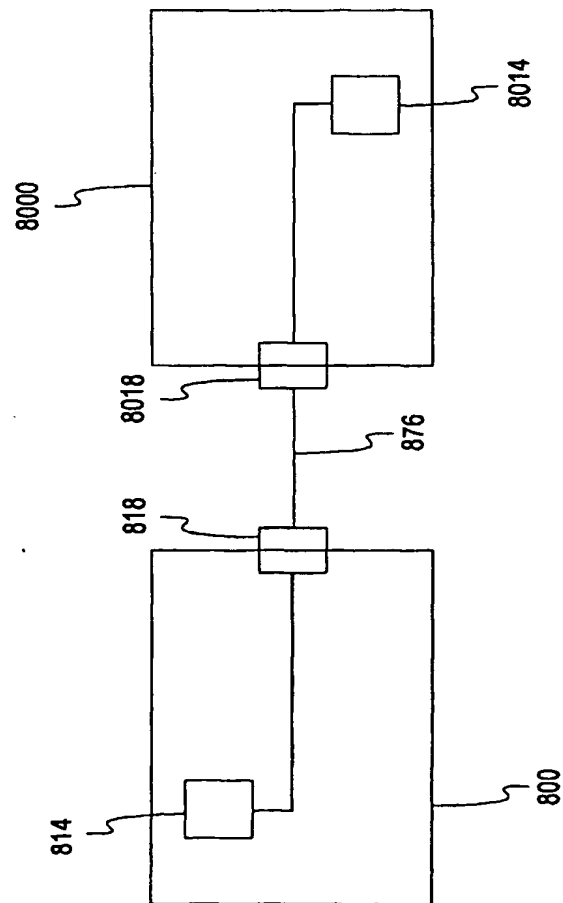
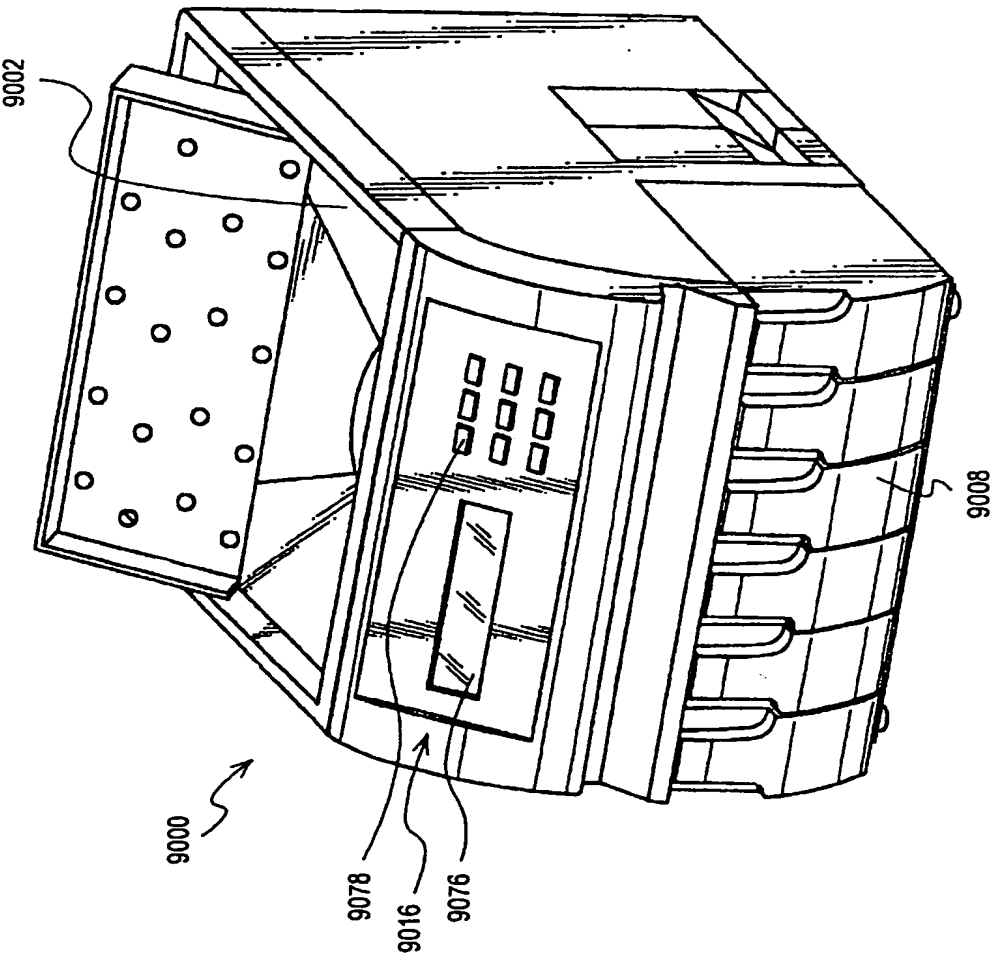


FIG. 8

FIG. 9



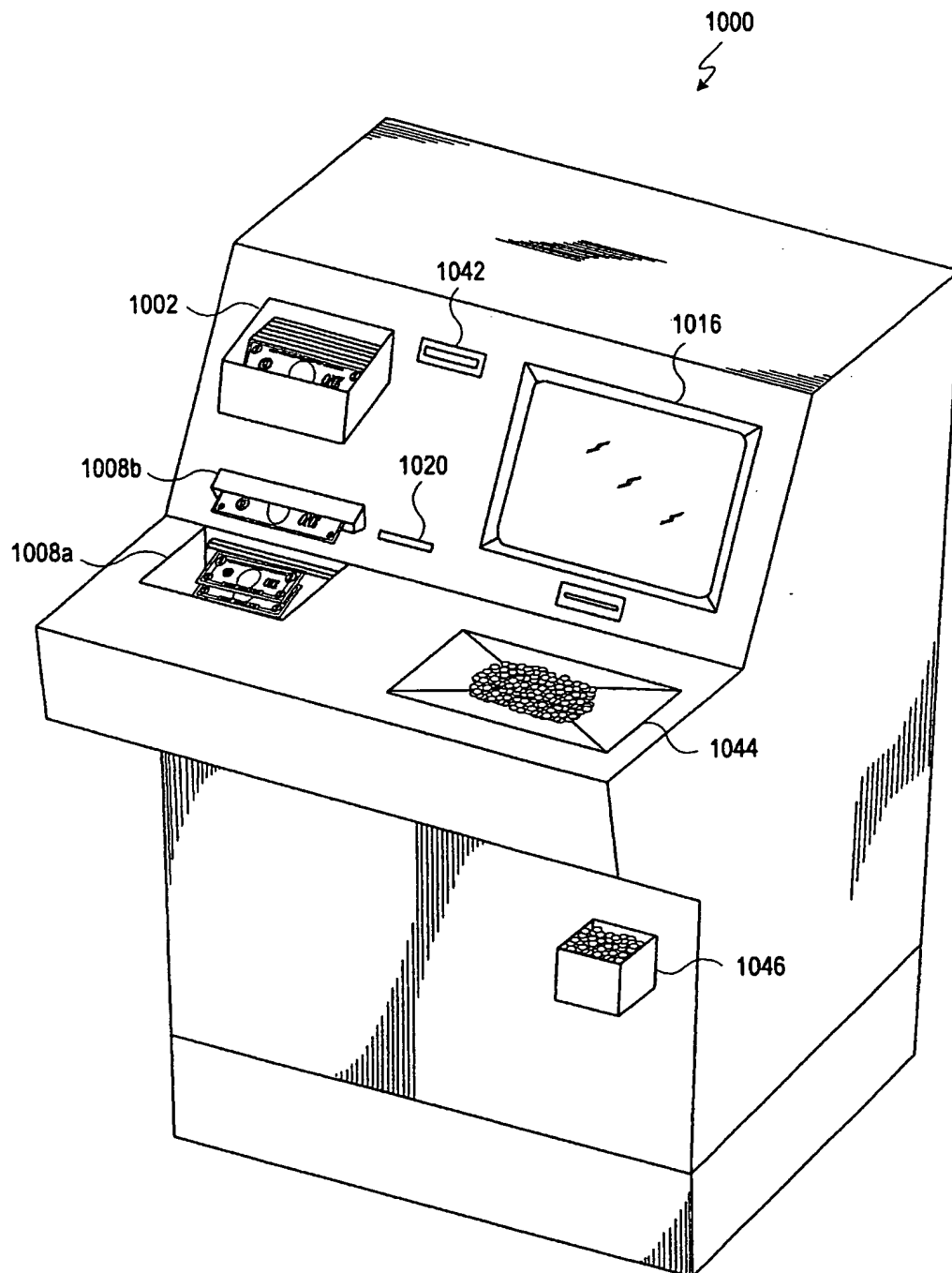


FIG. 10a

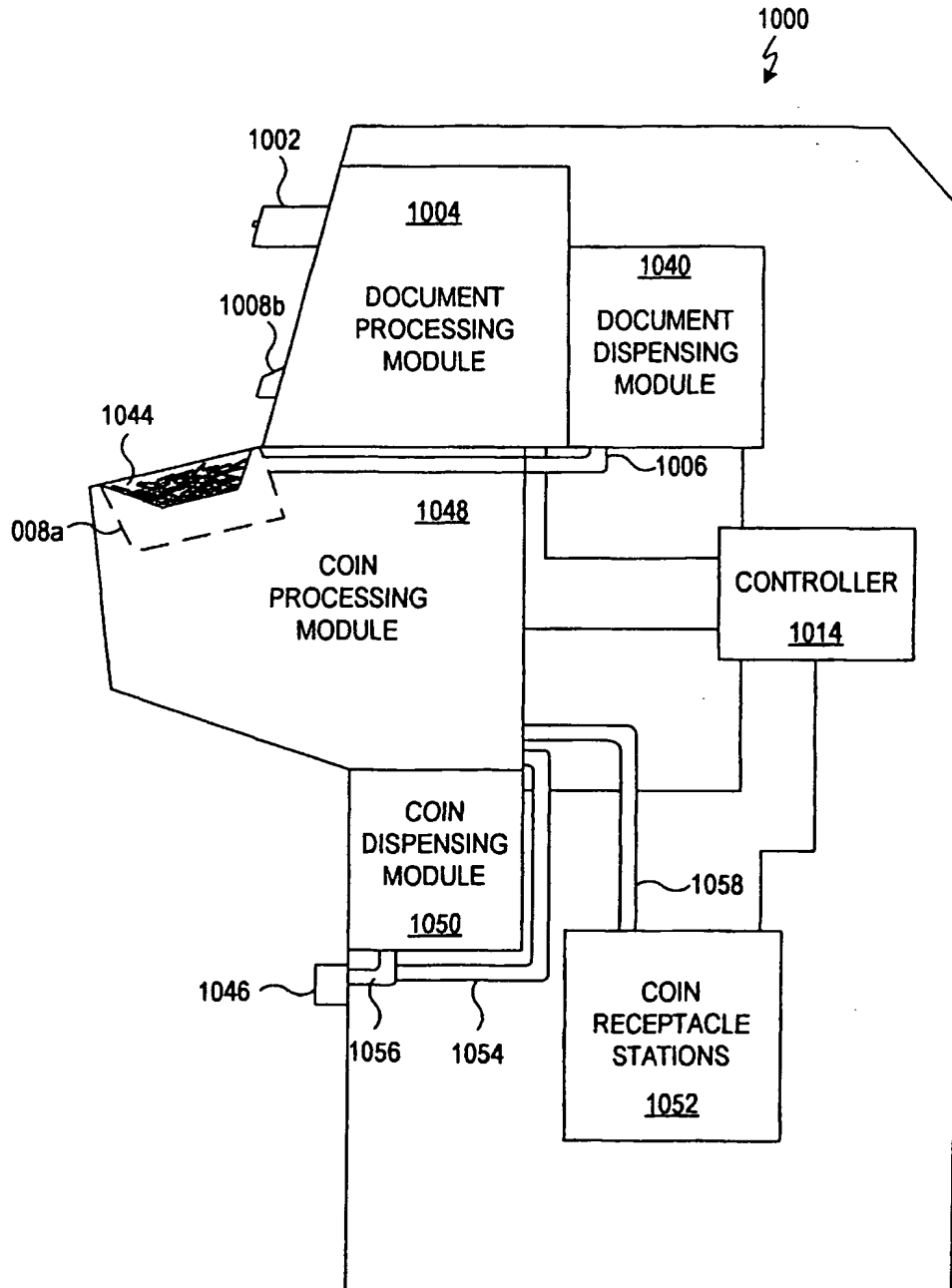
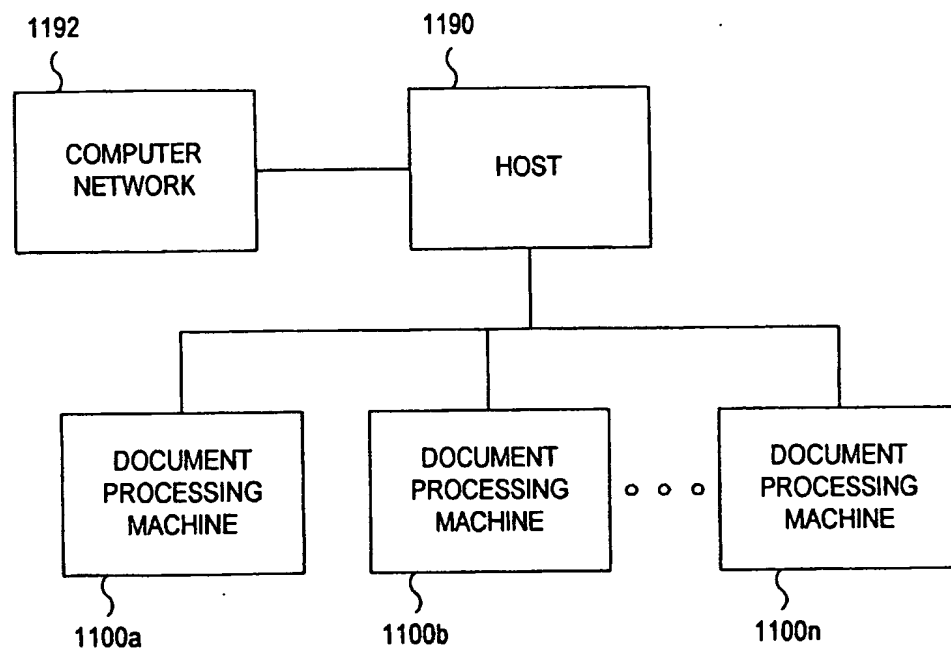


FIG. 10b

FIG. 11

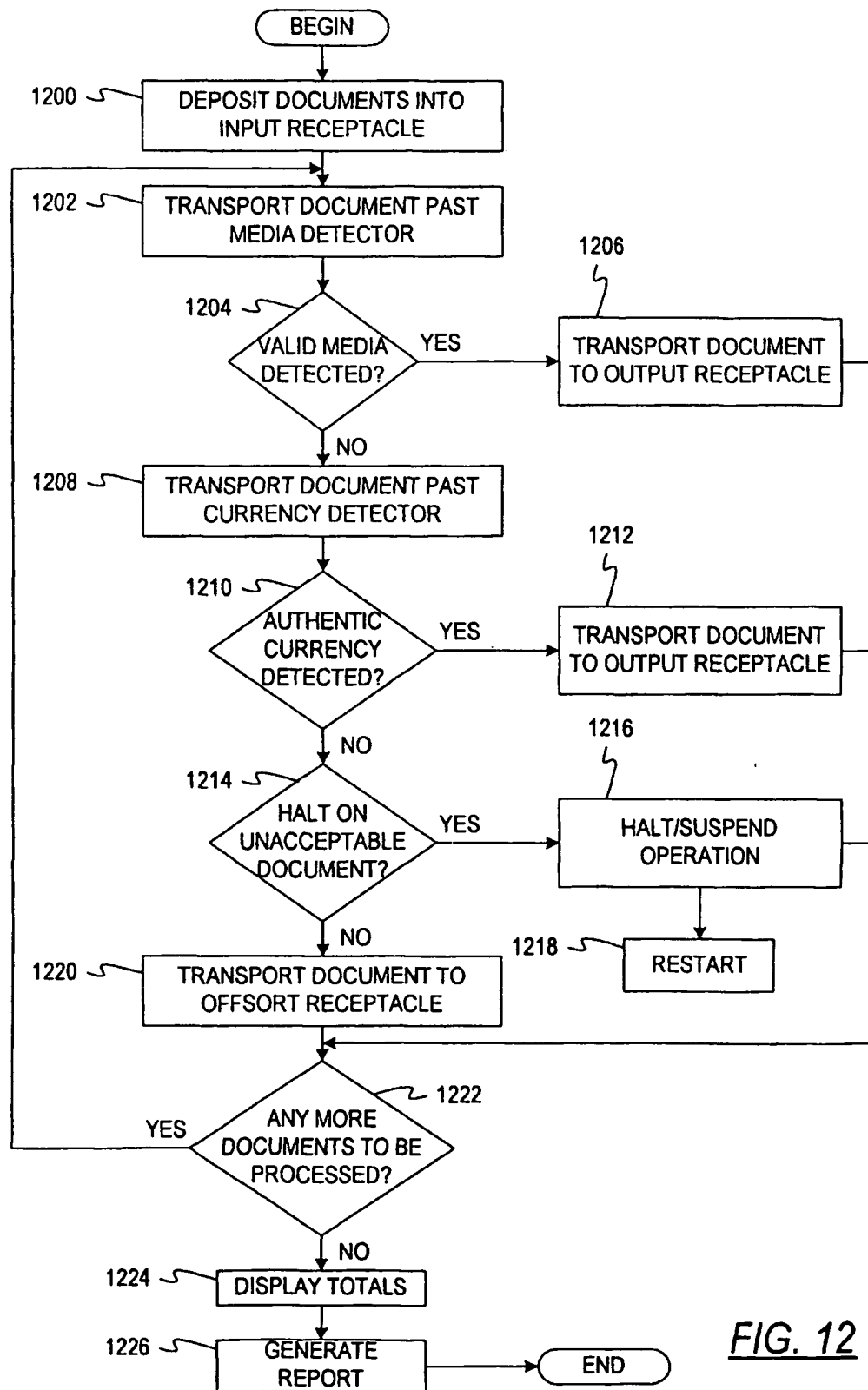
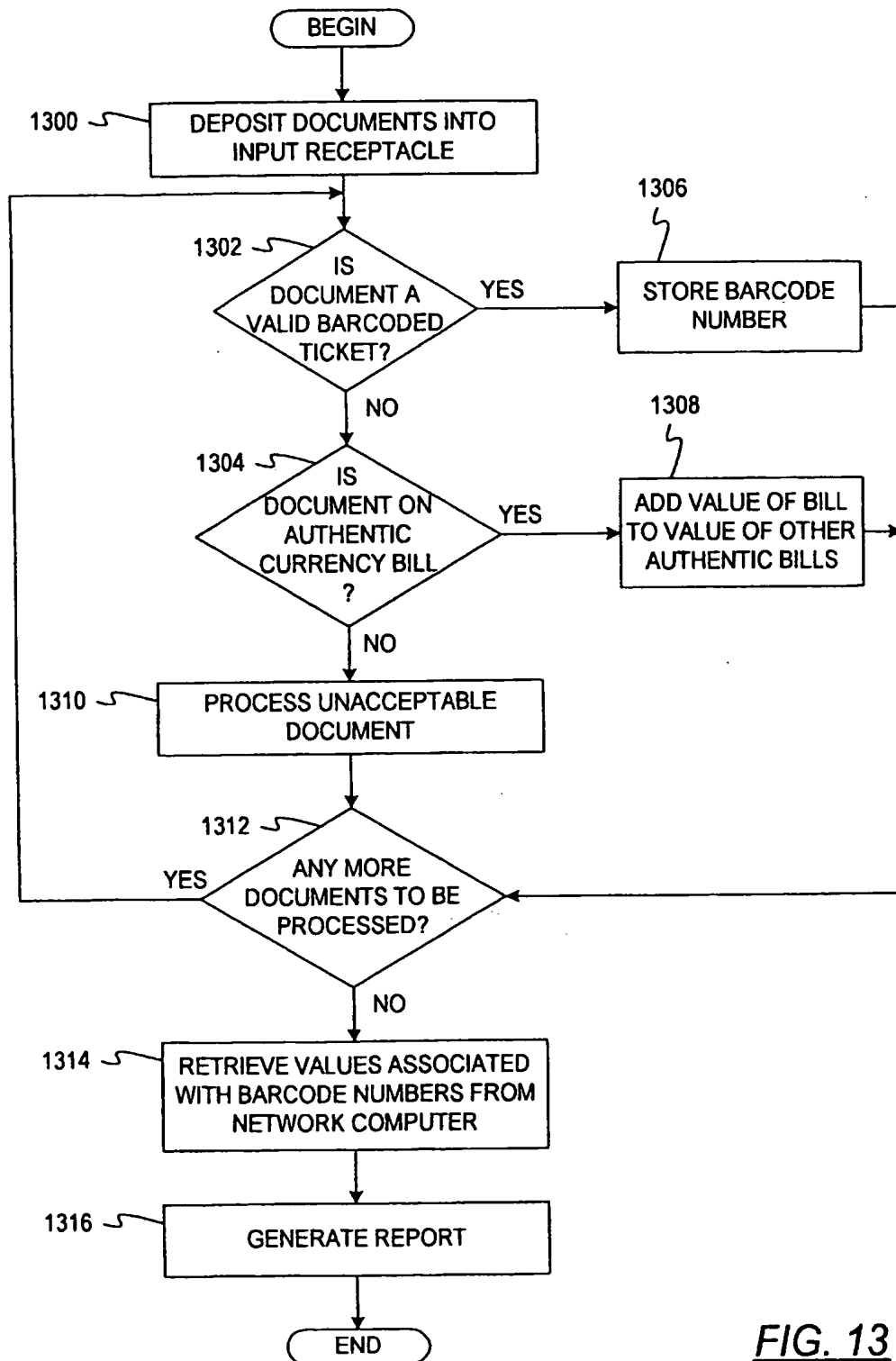


FIG. 12

**FIG. 13**

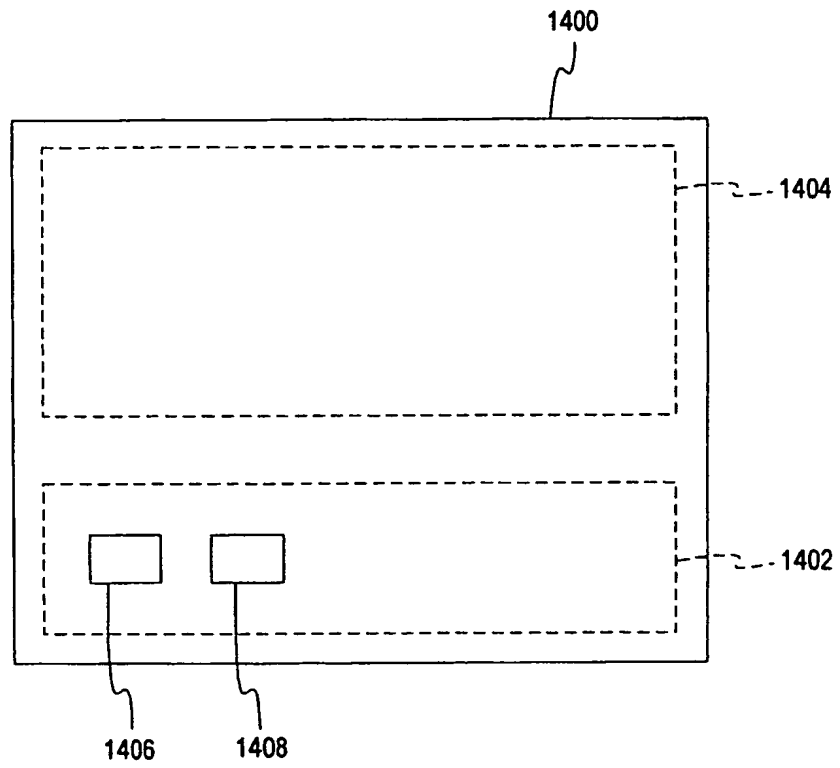


FIG. 14

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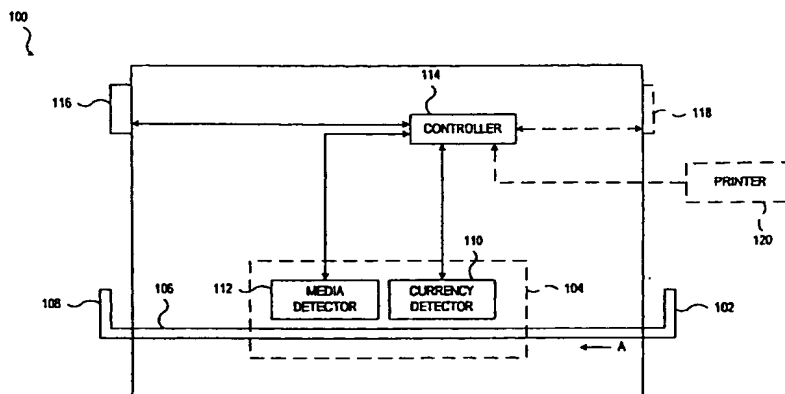
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- (71) Applicant: **CUMMINS-ALLISON CORP.** [US/US];
891 Feehanville Drive, Mount Prospect, IL 60056 (US).
- (72) Inventors: **JONES, William, J.**; 280 Poteet Avenue, Barrington, IL 60010 (US). **CSULITS, Frank, M.**; 18192 W. Banbury Drive, Gurnee, IL 60031 (US). **KLEIN, Robert, J.**; 3201 N. Ravenswood, Chicago, IL 60657 (US). **HAL-LOWELL, Curtis, W.**; 1417 E. Reynolds Drive, Palatine, IL 60067 (US).
- (74) Agents: **RUDISILL, Stephen, G.** et al.; Jenkins & Gilchrist, 225 West Washington Street, Suite 2600, Chicago, IL 60606 (US).
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Declaration under Rule 4.17:

— as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations

[Continued on next page]

(54) Title: **SYSTEM AND METHOD FOR PROCESSING CURRENCY BILLS AND SUBSTITUTE CURRENCY MEDIA IN A SINGLE DEVICE**



(57) Abstract: A document processing device (100) having an evaluation region (104) disposed along a transport path between an input (102) and output receptacle (108) capable of processing both currency bills and barcoded media. The evaluation region includes detectors (110) for detecting predetermined characteristics of currency bills and a barcode reader (112) for scanning the barcoded media. A controller (114) coupled to the evaluation region controls the operation of the document processing device and receives input from and provides information to a user via a control unit (216). In some embodiments, the document processing device may have any number of output receptacles (708a and 708b), and the control unit allows the user to specify which output receptacle receives which type of document. In some embodiments, an optional coin sorter (1048) may be coupled to the document processing device to allow document and coin processing. The document processing device may be coupled to a network (1192) to communicate information to devices (1100a-1100n) linked to the network.

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- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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PCT/US02/25662

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US CL : 194/207

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
U.S. : 194/207

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A, P	US 6,318,536 B1 (KORMAN et al) 20 November 2001 (20.11.2001), entire document.	1-111
A, P	US 6,390,269 B1 (BILLINGTON et al) 31 May 2002 (21.05.2002), entire document.	1-111
A	US RE. 29,796 E (YAMAMOTA et al) 10 October 1978 (10.10.1978), entire document.	1-111
A, P	US 6,412,619 B1 (ITO et al) 02 July 2002 (02.07.2002), entire document.	1-111

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